

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

LaVaughn F. Watts Jr.

Serial No.: **08/568,904**

Filed: **12/07/1995**

For: **REAL-TIME THERMAL MANAGEMENT FOR COMPUTERS**

Docket No.: **TI-20567**

Art Unit: **2112**

Examiner: **Meyers, Paul R.**

Conf. No.: **7575**

**SUPPLEMENTAL DECLARATION OF PRIOR INVENTION IN THE UNITED
STATES TO OVERCOME CITED PATENT - 37 C.F.R § 1.131**

Dear Sir:

I, LaVaughn F. Watts Jr., do hereby declare:

1. I am the inventor of the above-cited invention.
2. I submit this Supplemental Declaration to establish conception of the invention in this application in the United States on a date prior to October 11, 1994, which is the effective date of the cited U.S. patent to Dischler et al.(6,311,287)(newly cited by the Examiner in the Office Action dated May 13, 2005), and diligence in reducing the invention to practice from a date prior to October 11, 1994, which is the first effective date of cited U.S. patent to Dischler et al. (6,311,287), until the invention was actually reduced to practice on or before a date no later than December 15, 1994.
3. To establish the date of conception of the invention of this application prior to October 11, 1994, I submit true copies of the following documents (NOTE: EXHIBITS A-P submitted previously with Declaration on November 12, 2005):

EXHIBIT A - Copy of a slide presentation titled Notebook Strategic Business Unit Roadmap Key Technology Approach which I prepared on March 23, 1994 for presentation to TI upper management. It was my intent to commercialize the present invention, at least as of March 23, 1994, in a future TI laptop computer identified as project Lilyp which laptop would incorporate an Intel Pentium processor. Slide 1 discloses the Pentium processor as a P54C-100MHZ. Slide 2 identifies the project as "Pentium Notebook". Slide 3 discloses the notebook project as "Lily - 10.4 - Pentium 100MHz". Slide 8 discloses that the notebook project will have "heat management systems". Slide 9 discloses "TCP with Heat control". Slide 13 discloses "less heat - without fan;

EXHIBIT B - Copy of program DATA.ASM that I created on May 4, 1994 that was related to the present invention, that was to be implemented with Chicago (codename for Microsoft Windows 95);

EXHIBIT C - Copy of program BADATA.ASM that I created on May 4, 1994 that was related to the present invention, that was to be implemented with Chicago (codename for Microsoft Windows 95);

EXHIBIT D - Copy of program CHICAGO.INC that I created on May 4, 1994 that was related to the present invention, that was to be implemented with Chicago (codename for Microsoft Windows 95);

EXHIBIT E - Copy of e-mail message (08/30/94) from Mark Rendon to lily folks (of which Vaughn Watts was a recipient) which sets forth under "Notebook actions" & "Tasks", that Vaughn Watts was under #23 to have BatteyPro and SMI heat management ready on 09/15/94;

EXHIBIT F - Message from Jack Rawls to Dennie Shadrick (09/02/04), with copy to Vaughn Watts, identifying Project Milestones for Lilyp - Engineering models were due

09/23/94; Pre-production was due 10/14/94 and Mass production was due on 10/24/94. Page 2 of the document states "the testing (on completed Lilyp sample) yielded valuable data on thermal profiles";

EXHIBIT G – Copy of SWDEV Heat programs showing that I met the time table of 09/15/94 in EXHIBIT K above – see HEAT.BAT last modified on 09/14/1994;

EXHIBIT H - Copy of a slide presentation titled Notebook Strategic Business Unit Roadmap Key Technology Approach which I prepared on September 22, 1994, which was an update of my slide presentation dated March 23, 1994 for presentation to TI upper management (see EXHIBIT A). Most of the slides are repeats, with exceptions that slides 1 and 2 now identify the "Pentium Notebook" as being a "Lily Notebook". Slide 2 disclosed that the Lily Notebook Pentium-90, (i.e., Lilyp) predicted commercialization date has slid from late in 4Q94 to early 2Q95. Much of the remainder of the presentation is a repeat from EXHIBIT A;

EXHIBIT I – Copy of NewFile=Trange.INC which lifted and recoded on (10/14/94) which is relevant to the invention. {NOTE: changes made to the program after 10/14/94 to improve functionality are dated per the change date}.

EXHIBIT J – Copy of e-mail message from Sandeep Bhadsavle to Vaughn Watts (11/02/94) informing Vaughn that the "2nd IO channel 54h (cmd/sts just like 64h) & 50h (data just like 60h) is now functional (which was channel from which to read CPU temperature). Also note the fourth line from the bottom which states, "all comdex units will have this upgrade";

EXHIBIT K – Copy of e-mail message from Sandeep Bhadsavle to Vaughn Watts (11/03/94) encouraging Vaughn to write to 64h and read data 60h for response. And

responsive message from Vaughn Watts to Sandeep telling him that I tried to read the cpu temp (second ad channel) using the c4h command with no luck;

EXHIBIT L – Copy of document showing that “Read A/D support on 54/50 added” (Released 11/08/94). This is important since this change allowed my invention to work as designed;

EXHIBIT M – Copy of Vaughn Watts expense report for the dates 11/11-17/94 for trip to COMDEX convention in which I took an engineering model of a laptop computer that incorporated the invention in order to show it (under Non-Disclosure Agreement only) to suppliers and potential customers. The invention was reduced to practice in the engineering model as of this date;

EXHIBIT N - Copy of SWDEV Heat programs. With the exception of one ZIP file, all were completed prior to 11/09/94;

EXHIBIT O – Copy of pages 2, 17, 20, 21 and 23 of a document entitled “Lily Keyscan Board Specification – Revision 2.4 – November 16, 1994”, which shows that CPU and battery temperature were being detected and evaluated;

EXHIBIT P – Copy of FILE=Thermal.Equ (dated 12/15/94) as disclosed on page 44 of the present application. Line TP1 confirms that equ 50;90 was tested. This is evidence that a version of the invention intended for deployment in a commercial product was working as of this date.

EXHIBITS A-P above were previously submitted with Applicant’s Declaration of Prior Invention in the United States to Overcome Cited Patent – 37 C.F.R. § 1.131 mailed to the USPTO on November 14, 2005 – and are not being resubmitted. The below additional exhibits are being submitted herewith.

EXHIBIT Q – Confirms that the file HEAT.BAT existed as of September 14, 1994. HEAT.BAT (HEAT.BAK on disc) was used for testing and factory run-in to ensure temperature monitoring and countermeasures conformed to specification and was released for engineering model build no later than September 14, 1994.

EXHIBIT R – Copy of file AMP530F.ASM in which coding was started no later than May 4, 1994. The file is a routine to enable/disable power management.

EXHIBIT S – Copy of file AMP5306.ASM in which coding was started no later than May 4, 1994.

EXHIBIT T – Copy of file BA.ASM, which is related to file BA.DATA identified in EXHIBIT C.

EXHIBIT U – Copy of file TEMPTM5.ASM which I coded no later than August 30, 1994.

EXHIBIT V – Document created by Applicant to show how the claim limitations are supported by the cited exhibits

EXHIBIT W – Document created by Applicant to show timeline of completed events – to be used in conjunction with EXHIBIT V.

4. DISCUSSION – I was preparing code for the present invention on or before May 4, 1994. EXHIBIT B shows that the files: idletick, timertick; keyboardtick; power_level; dos_power_level; Maxpower_level; busy_int2f; busy_int28; busy_int21; wstack; ac_parms; sound_parms; ESeries; and sleep_tick_count were coded as of May 4, 1994. I finished the code for the prototype model no later than September 2, 1994. The prototype model, which used ram-based memory, was tested and received preliminary UL

(Underwriters Laboratory), CUL, and TUV approval no later than September 2, 1994 (see third paragraph of EXHIBIT F-2 under "New Products"). Line 1 of EXHIBIT F-3 indirectly confirms this by stating that "remaining" LilyP prototypes were to be completed, which confirms that at least one prototype was finished by September 2, 1994.

EXHIBITS G, N and Q confirm that the file HEAT.BAT existed no later than September 14, 1994 and this file was implemented in the prototype model running as of September 2, 1994. HEAT.BAT (HEAT.BAK on disc) was used for testing and factory run-in to ensure temperature monitoring and countermeasures conformed to specification and was released for engineering model build no later than September 14, 1994. EXHIBIT R is a copy of file AMP530F.ASM in which coding was started no later than May 4, 1994. The file is a routine to enable/disable power management. EXHIBIT S is a copy of file AMP5306.ASM in which coding was started no later than May 4, 1994. The file is a routine to determine if the CPU is busy – if yes, it reduces IDLE. Files AMP530F.ASM and AMP5306.ASM are associated with program CHICAGO.INC identified in EXHIBIT D.

EXHIBIT T-(1-5) discloses file BA.ASM, which is related to file BA.DATA identified in EXHIBIT C. File BA.ASM is a routine to determine if the CPU requires thermal slice servicing. The file was completed sometime between May 4, 1994 and August 30, 1994. BA.ASM-1 shows the file contains a FORCED COOLDOWN LOOP at Interrupt level. BA.ASM-2 shows the file called on every system timer interrupt and was ready to look at a thermal event. BA.ASM-3 shows that TLEVELn interfaces with TEMPTM5.ASM for RAM Based or interfaces with CMOS storage for same A/D Temperature value if FLASHROM Based. It also confirms the file enabled looking at a thermal event slice period based on temperature. BA.ASM-4 confirms AC and Battery Operation House cleaning and NON-Thermal Management Event. BA.ASM-5 confirms Thermal Management Event – slice needed during interrupt? and forcing cool down loop.

EXHIBIT F-1 confirms that non-production engineering models of the apparatus (LilyP) were to be completed no later than September 23, 1994, with pre-production engineering models to be completed no later than October 14, 1994. The non-production engineering model of the apparatus (LilyP) was completed no later than September 23, 1994. EXHIBIT U-(1-3) discloses relevant portions of file TEMPTM5.ASM which I coded no later than August 30, 1994. To the extent I made any changes to file TEMPTM5.ASM as it evolved into file Trange.INC, the changes did not affect the patentability of the claims. As with the prototype, the pre-production model used ram-based memory. However, the pre-production model slated for completion on October 14, 1994 was specified to have ROM-based memory. Accordingly, I finished re-coding file TEMPTM5.ASM as file Trange.INC (EXHIBIT-I) on a date no later than October 14, 1994 so as to run on a ROM-based preproduction model.

Further, since agency testing was started before 9/15/94, all code that changed clocks had to be finished before FCC agency testing was started. That did not mean that I could not change the time that I spent inside one clock or another (e.g. change the temperature settings ranges, or change the period within the clock cycle to better save more power or more heat). However I could not introduce any NEW frequencies and had to be able to run at all frequencies. As for UL I needed the thermal management to pass the UL or it would get too hot, so in combo of agency testing, the raw basic code was there.

The major differences after 9/15/94 was changing the code over to use the ROM rather than RAM, then use FLASH rather than ROM. After the alternate channels 50 and 54 hex to the keyboard controller to read the A/D to get the temperature was not written until 10/14. Prior to 10/14 I used channels 60 and 64 hex to read the A/D from the keyboard controller to get the temperature. Both channels were to give the exact same information. However for IBM compatibility, I needed to change the temperature read channel from 60/64 to 50/54 prior to production to keep software from locking up that

might access the keyboard via the 60/64 at the same time that we wanted to read the temperature. Also, by changing the channels to 50/54 I could read the temperature anytime without worrying about who was also accessing the keyboard controller and when. Evidence documenting the problem with the 50/54 channel that I found after I changed to code over to use it prior to engineering model used at COMDEX is found in EXHIBITS J, K, L. The original patent application was filed with my best implementation of all the code at the time that included things done on or before 9/15/94 up to filing the patent. I was very careful in the code to note when I made changes.

The TRANGE code submitted was what was used in production. Notice that it read as "recoded from TEMPTM5". There is no change notice inside the code reflecting any other changes. The only thing different about this code and the TEMPTM5 code was the use age of 50/54 in the TRANGE vs. 60/64 in the TEMPTM5 code. I had to keep two sets of code running at the time. The agency code and test code used the TEMPTM5 with 60/64 channel access and the TRANGE used the 50/54 and it was in debug stage until the 50/54 code worked. Functionality was split between the Flash Driver Interface and the FlashROM code after October 14, 1994. The main logic of TEMPTM5.ASM was later used inside the RAM portion of the Flash Driver Interface that called TRANGE located in FLASH ROM. From August 30, 1994 until October 14, 1994, RAM resident functions within TEMPTM5.ASM were used for testing, prototype, and samples.

My debugging was successful and this problem no longer existed in the engineering model of the laptop computer (Lily) that I took to the COMDEX convention during 11/11-17/94. So, the units for COMDEX used the new TRANGE code rather than the test agency code. However, for patent purposes, the codes were functionally the same with regard to the invention for which patenting is sought.

EXHIBIT E task #6 shows that the complete board layout for a prototype computer was to be finished by September 2, 1994. Accordingly, I confirm that – Copy of e-mail

message (08/30/94) from Mark Rendon to Lily folks (of which Vaughn Watts was a recipient) which sets forth under "Notebook actions" & "Tasks", that Vaughn Watts was under #23 to have BatteyPro and SMI heat management ready on 09/15/94, which were to be implemented on the prototype computer finished by September 2, 1994.

In the Office Action dated February 2, 2006, Examiner determined that Applicant's Declaration submitted on November 14, 2005 "did not indicate which claim limitations are supported by the cited Exhibits". EXHIBIT V is a document I have created to indicate which claim limitations are supported by the cited Exhibits. EXHIBIT I is cited extensively in EXHIBIT V to provide enabling support for the claims. EXHIBIT I is a copy of NewFile=Trange.INC which lifted and recoded on (10/14/94) and was the code used on the engineering model I took with me to COMDEX. It is important to note, however, that file Trange.INC is a recoding of a previous file TEMPTM5.ASM., which was implemented on a prototype computer on or before September 15, 1994, and for patentability purposes, provided the same support.

EXHIBIT V – (1-6) show how Claim 17 is supported by the cited Exhibits. EXHIBIT V – (7-12) show how Claim 18 is supported by the cited Exhibits. EXHIBIT V – (13) shows how Claims 19 and 20 are supported by the cited Exhibits. EXHIBIT V – (14-22) show how Claim 21 is supported by the cited Exhibits. EXHIBIT V – (23-24) show how Claim 23 is supported by the cited Exhibits. EXHIBIT V – (25-36) show how Claim 74 is supported by the cited Exhibits. EXHIBIT V – (37-50) show how Claim 75 is supported by the cited Exhibits. EXHIBIT V – (51-64) show how Claim 76 is supported by the cited Exhibits. EXHIBIT V – (65) shows how Claims 77-79 are supported by the cited Exhibits. EXHIBIT V – (66) shows how Claims 80-82 are supported by the cited Exhibits. EXHIBIT V – (67) shows how Claims 80-82 are supported by the cited Exhibits. EXHIBIT V – (68) shows how Claims 83-85 are supported by the cited Exhibits. EXHIBIT V – (69-71) show how Claims 83-85 are supported by the cited Exhibits. EXHIBIT V – (72-74) show how Claims 86-88 are supported by the cited Exhibits. EXHIBIT V – (75-77) show

how Claims 88-91 are supported by the cited Exhibits. EXHIBIT V – (78) shows how Claims 92-94 are supported by the cited Exhibits. EXHIBIT V – (79-80) show how Claims 95-97 are supported by the cited Exhibits. EXHIBIT V – (81-82) show how Claims 83-85 are supported by the cited Exhibits. EXHIBIT V – (83) shows how Claims 101-103 are supported by the cited Exhibits. EXHIBIT V – (84-85) show how Claims 104-106 are supported by the cited Exhibits. EXHIBIT V – (86) shows how Claims 107-109 are supported by the cited Exhibits. EXHIBIT V – (87) shows how Claim 110 is supported by the cited Exhibits. EXHIBIT V – (88) shows how Claim 111 is supported by the cited Exhibits. EXHIBIT V – (89) shows how Claim 112 is supported by the cited Exhibits. EXHIBIT V – (90) shows how Claim 113 is supported by the cited Exhibits. EXHIBIT V – (91) shows how Claim 116 is supported by the cited Exhibits. EXHIBIT V – (92) shows how Claims 117-118 are supported by the cited Exhibits. EXHIBIT V – (93) shows how Claim 119 is supported by the cited Exhibits. EXHIBIT V – (94-102) shows how Claim 122 is supported by the cited Exhibits. EXHIBIT V – (103-111) shows how Claim 123 is supported by the cited Exhibits. EXHIBIT V – (112-121) shows how Claim 124 is supported by the cited Exhibits. EXHIBIT V – (122-130) shows how Claim 125 is supported by the cited Exhibits. EXHIBIT V – (131-139) shows how Claim 126 is supported by the cited Exhibits.

EXHIBIT W is a document created by Applicant to show timeline of completed events – to be used in conjunction with EXHIBIT V.

5. I hereby declare that I conceived the invention (see Exhibits A & H) on a date prior to October 11, 1994, which is the first effective date of cited U.S. patent to Dischler et al. (6,311,287). Thereafter I worked diligently on reducing the invention to practice in a timely and orderly manner (see Exhibits B-G & Q-U) from at least one day prior to October 11, 1994, which is the first effective date of cited U.S. patent to Dischler et al. (6,311,287) until the invention (using HEAT.BAT - BatteyPro and SMI heat

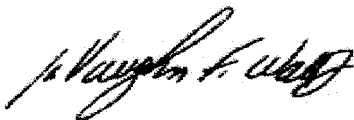
management ready on 09/15/94, implemented on the prototype computer finished by September 2, 1994) was actually reduced to practice, which Applicant now believes to be no later than September 15, 1994 - which is prior to October 11, 1994.

Even if, arguendo, a determination is subsequently made that I have not submitted sufficient proof to show actual reduction to practice no later than September 15, 1994, I respectfully submit that the above identified Exhibits prove conception of my invention and additional Exhibits I-O show that I worked diligently on reducing the invention to practice in a timely and orderly manner from at least one day prior to October 11, 1994, which is the first effective date of cited U.S. patent to Dischler et al. (6,311,287) until the invention was actually reduced to practice. While I now believe that my invention was actually reduced to practice no later than September 15, 1994, in the event the evidence I submitted is insufficient to show actual reduction to practice by September 15, 1994, I believe that the submitted evidence proves diligence in reducing the invention to practice no later than November 8, 1994 (fall back actual reduction to practice date) in the engineering notebook model I took to COMDEX on November 11, 1994. Accordingly, I now respectfully submit that my actual reduction to practice date was well before December 15, 1994 (see Exhibit P).

6. I submitted my original Declaration prior to final rejection and was submitted at Applicant's first opportunity to respond since the Dischler et al. reference was first cited in the Office action dated May 13, 2005. Examiner later determined in an Office Action dated February 2, 2006, that the Declaration was insufficient to establish diligence from a date prior to the date of reduction to practice of the Dischler et al reference to either a constructive reduction to practice or an actual reduction to practice. More particularly, Examiner determined that the Declaration does not indicate what claim limitations are supported by the cited Exhibits. While I disagree with Examiner's insufficiency determination, I now submit this Supplemental Declaration to clarify the record and clearly overcome Examiner's insufficiency determination. This Supplemental Declaration is my

first opportunity to respond to Examiner's insufficiency arguments as set forth in the Office Action dated February 2, 2006.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



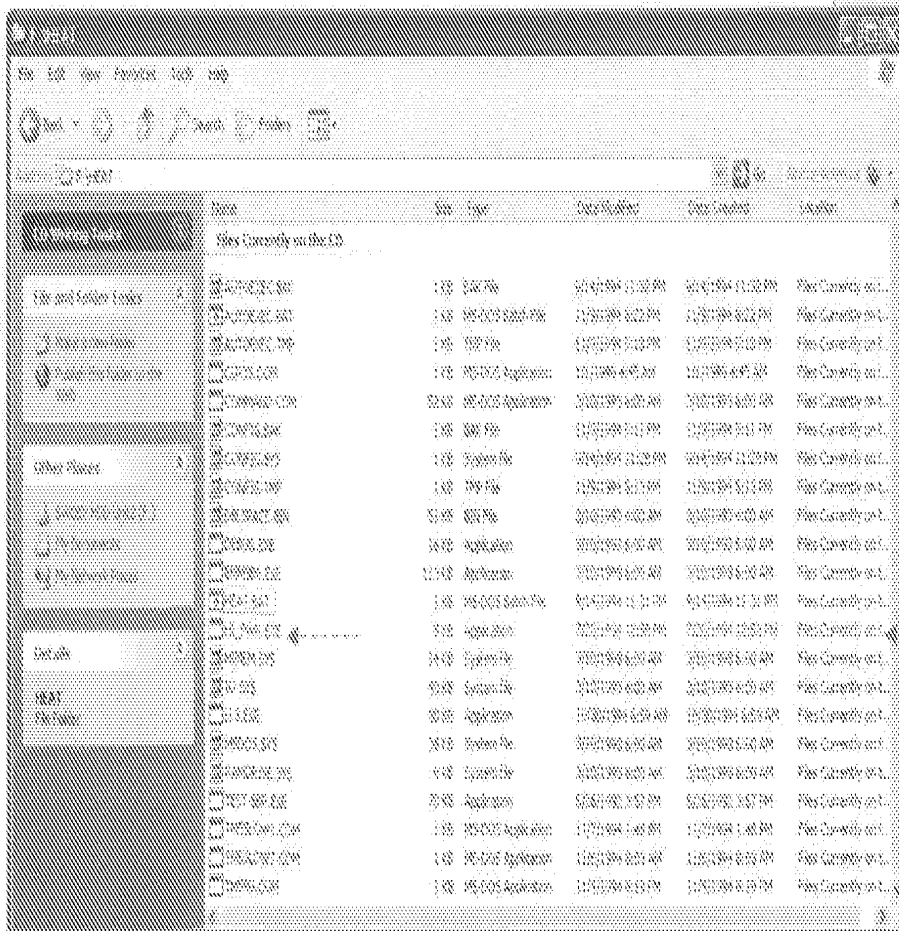
La Vaughn F. Watts Jr.

	Signed by: Vaughn F. Watts	
	Date: Timestamped	
	Location:	
Date: November 14, 2006	Reason: Final	7GswT2aWCT/jVqoxUTTPtTOOpA=

New Exhibit HEAT



HEAT.BAT (HEAT.BAK on disc) used for testing and factory run-in to ensure temperature monitoring and countermeasures conformed to specification – release to factory 9/14/1994 for Engineering Model Build



```
Heat.bat runs program
Hi_pwr.exe
To generate Heat inside
Engineering Model
Hi_pwr.exe created
7/20/1994
```

Exhibit HEAT-1

EXHIBIT Q-1

New Exhibit APM530F.ASM

[illegible]

Routine to enable/disable
Power Management – started
Coded 5/4/94

```

APM530F.ASM:orginal
File Edit Format View Help

;File=APM530F.ASM
;Watts
;1/6/94
;Coded for Chicago 1/4/94

; Enable/disable Power Management Functionality
;Enter: ah = 53h
;       al = 0Fh
;       bx = FFFFh Enable/disable all power management
;       cx = 0 to disable power management
;           1 to enable power management
;Exit:  if successful
;       CY = clear
;       if unsuccessful
;       CY = set
;       ah = 01h power management functionality disabled
;           09h unrecognized device ID
;           0Ah parameter in CX out of range

APM530F:proc near

```

Exhibit APM530F.ASM-1

EXHIBIT R

New Exhibit APM5306.ASM

```

; APM5306.ASM 10/2/94
;
; FILE=APM5306.ASM
; Vaughn watts 2/22/92
; Coded for Chicago 5/4/94 watts
;-----CPU BUSY POLL LOOP-----
;
; CPU Busy
; Enter: AH = 33h
;       AL = 06h
; Exit:  CF = 0
;
APMCPUBusy  PROC    NEAR
;
; push    ds                ; Save Data Segment
; push    cs                ; Save Code Segment
; pop     ds                ; Setup common real vs p32 mode
; call    CommonAPMCPUBusy
; pop     ds
; pop     si
; ret
APMCPUBusy  ENDP
;
CommonAPMCPUBusy  PROC    NEAR
;
; cmp     interface_connect,interface_off
; jne     APM5306NotConnected
;
; cmp     APMEngagedSystem,interface_engaged
; jne     APM5306NotEngaged
;
; Give the CPU some bandwidth
;
; mov     timerick,0        ; Slow down idle
; mov     timertick,0       ; Slow down Int ZI
; cld
; ret
;
APM5306NotEngaged:
; mov     ah,APM_ERROR_0B
; stc
; ret
;
APM5306NotConnected:
; mov     ah,APM_ERROR_03
; stc
; ret
;
CommonAPMCPUBusy  ENDP

```

Routine to determine if CPU is
busy – reduces IDLE
started Coded 5/4/94

Exhibit APM5306.ASM-1

EXHIBIT S

New Exhibit BA.ASM

```

;*****
; BA.ASM: New Intel Power Map
;*****

;
; FILE:BA.ASM
; Author: Varkit 3/01/94
;
;*****
;
; Interrupts & Timer interrupt service routine.
;
;*****
;
; Note the following two labels and relationship to each other can
; not change. They are in fact a device for vectoring to
; the default TIMER mode of interrupt interrupt.
;
; timer_tick      dw 0          ; int vector/dw this loop on interrupt
; seg_timer       dw 0          ; segment vector/dw this loop on timer
;
; INCLUDE ..\cpu\BA.asm
; INCLUDE ..\cpu\Thermal.asm
; INCLUDE ..\asm\Bata.asm
;
;*****
;
; TIMERINT interrupts and handles the timer tick interrupt on
;
; Note that this routine is executed once per timer tick, but the
; updating of time is only done once per minute. This should make
; it virtually non-noticeable as far as power consumption goes.
;
; Also, the UPDATE_IN_PROGRESS flag are stored in here
;
;*****
;
; Read AC Port Operations
;
; BATTERY_TEST
;
;   je      on_battery
;   inc     curr_ac_current/bytesChargeTime
;   jmp     short belowPowerTime
;
; on_battery:
; belowPowerTime:
;
; Do the Low Power Times
;
;
; BATTERY_TEST
;
;   test    al, LOW_BATTERY_BIT    ; find out if low battery?
;   je      battery_is_low_port    ; yes
;   jmp     battery_high_half
;
;*****
;
;*****

```

Routine to determine if CPU is
needing thermal slice
servicing. Written sometime
on or after 5/4/94 and before
8/30/1994. – contains
**FORCED COOLDOWN
LOOP** at Interrupt level.

Exhibit BA.ASM-1

New Exhibit BA.ASM

Called on every system timer interrupt

```

timer_interrupt proc far
    pushf                                ; protect the interrupted flags
    pusha

    push    dx
    push    cx                                ; {5,10,C7}
    push    cx                                ; {5,10,C7}
    pop     dx                                ; {5,10,C7}

;
;
; Is APB State OK?
;                                ; {5,10,C7}

    APB_STATE OK                     ; byte to hold APB Write Flag
    out     CRW,AP,al                    ; Output it to CRW
    in      al,CRW,DT                    ; and store it

;
; Check Command Register
;

    mov     al,00h
    jnc     CheckAPBCommand1

    mov     byte ptr [APBCommandCurrent,al] ; Setting location
;{5,10h}mov     power_level,0           ; Take it away - power zero
    mov     al,00h                        ; Completed command
WriteAPBCommand:
    out     CRW,DT,al                    ; New command
    jnc     short APBCommandComplete

EnablePowerManagement:
    mov     byte ptr [APBCommandCurrent,al] ; Setting location
    mov     al,00h                        ; command completed
    jnc     short WriteAPBCommand

CheckAPBCommand1:
    mov     al,00h
    jc     EnablePowerManagement

    mov     al,00h
    jc     APBCommandComplete            ; Waiting on Clear

    mov     al,00h
    jc     APBCommandComplete           ; Stop Power Saving APB

    mov     ah,al
    xch     al,al
    out     CRW,DT,al                    ; Clear it
    mov     al,ah
    xch     ah,ah
    add     esp,4*4*count,ah            ; done

```

[illegible]

Now ready to look at thermal event

Exhibit BA.ASM-2

New Exhibit BA.ASM

NON-Thermal Management Event

[illegible]

```

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000
1001
1002
1003
1004
1005
1006
1007
1008
1009
1010
1011
1012
1013
1014
1015
1016
1017
1018
1019
1020
1021
1022
1023
1024
1025
1026
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1037
1038
1039
1040

```

AC and Battery Operation House cleaning

Exhibit BA.ASM-4

EXHIBIT 74

New Exhibit BA.ASM

Thermal Management Event –
slice needed during interrupt?

```

ThermalManagement:
    File Edit View Insert Format Help
    [Icons]

    rjmp exit:
    pop     ax
    pop     dx
    pop     [ ]

    ;
    ;   Time for Thermal Management?
    ;

    mov     cx,ThermalSlice,TSLICE0
    jz      BAExitNow           ; Heat okay
    dec     ax:TimeThermalSlice
    jnz     BAExitNow           ; Not our time
    ;
    ;   Sleep return for our slice
    ;

    jmp     [ ]                ; Success

    pushf
    push    ax                 ; By cs
    push    offset ThermalSuspend ; By eip
    jmp     BATransfer

BAExitNow:
    popf
BATransfer:
    jmp     BAOutsideHeatLoop ; do other chilled timer routines

    with:movfi
    
```

forcing cool down loop – really
a “one shot” since CX=1

```

BA.ASM - WordPad
File Edit View Insert Format Help
[Icons]

ThermalSlice      db    TSLICE0
TimeThermalSlice  db    0
BATempdebug       db    0x0b

ThermalSuspend:
    pushf
    push    ds
    push    cs
    pop     ds

    pusha

    mov     cx,1

BAOutsideHeatLoop:

    call    force_sleep

    ;;;    sti
    ;;;    nop
    ;;;    hlt

    loop    BAOutsideHeatLoop

    mov     al,ThermalSlice
    mov     TimeThermalSlice,al

    popa

    pop     ds
    popf
    iret

    For Help, press F1
    
```


New Exhibit TEMPTM5.ASM

```
.File=TEMPTM5.ASM
.Coded: Watts (8/30/94)
.Added new BPED CMOS Locations for holding values: Watts (10/14/94)
.Changed Keyboard channel to 50/54 for the C4 command so no lockups (10/14/94)
.Secondary keyboard channel now works for Lillytemp.. be sure to get new
keyscan code from Sandeep and update your H8 ..11/19/94vw
.Reviewed for final bios issues 2/11/95
```

```
    Read the Battery on LILLYP from Keyboard Controller
    Calling Arguments
    Call TempLilyBattery
    cmp     al,0ffh
    je      OnACLoadFF      ; Don't know value since it's on Charge
```

```
TempLilyBattery Proc Near
```

```
    mov     al,0ffh
    ret
```

```
    mov     TempLilyBusy,1
```

```
    push    si      ; Save registers not needed
    push    cx
```

```
    CLI          ; Disable Interrupts
```

Also Reads A/D
Converter for Lillyp
(TM5000)
Temperature
Sensor when it
reads battery status

Exhibit TEMPTM5.ASM-1

EXHIBIT U-1

New Exhibit TEMPTM5.ASM

```
PBBATTERY_RETRY equ 250
    mov cx,PBBATTERY_RETRY ;retries
tset_quiet_0:
    in al,54h
    test al,1 ;check the output buffer status
    jz tset_quiet_1 ;output buffer not full?
    jmp short tSet_status_unknown:[7.10T3]

tset_quiet_1: ;yes, output buffer not full.
    test al,2 ;check input buffer status
    jnz short tSet_status_unknown:[7.10T4]
;
; Should keyboard or Aux or both be disabled at this point?
;
; To disable keyboard, port 64=0adh to disable aux, port 64= 0a7h
; To enable keyboard, port 64=0aeh to enable aux, port 64= 0a8h
;
    mov al,0e4h ;no, then output the read A/D
    out 54h,al ;was 64h 10/14/94vw
tset_quiet_2:
```

Modified on
10/14/94 to use
new 50/54h A/D
channel rather than
previous 60/64h
channel

EXHIBIT U-2

Exhibit TEMPTM5.ASM-2

New Exhibit TEMPTM5.ASM

```

tSet_quiet_2_Okay:      ;[7.10.3]
    jmp     $+2
    in      al,54h      ;read status port
    jmp     $+2
    jmp     $+2
    test    al,2 ;3     ;check status of input port and output port.
    jnz     tset_quiet_2 ;full ?, then go back.
    mov     al,06       ;empty, then output the read A/D 6
    out     50h,al      ;was 60h 10/14/94vw

```

Modified on
10/14/94 to use
new 50/54h A/D
channel rather than
previous 60/64h
channel

```

tset_quiet_3:
    loop    tSet_quiet_3_Okay ;[7.03]
    jmp     short tSet_status_unknown ;[7.03]

```

```

tSet_quiet_3_Okay:
    jmp     $+2
    in      al,54h      ;read the status 10/14/94vw
    test    al,1        ;check the output buffer status
    jz      tset_quiet_3 ;check if output buffer not full, then go back

```

Reads Temperature
Data from Sensor

```

    in      al,50h      ;full, then get A/D value 10/14vw
    mov     TempLily,al

```

Reads Temperature
Data from Sensor

```

;
; Constant 00 - 255 value : 0 -- 5000mV
; Constant 10mV/1 degree C
; k = (5000/255) = 19.607843
; n degree C = k/10
; n degree C = k/10 * Value
;

```

Read of Temperature
Data from Sensor must
be converted to n degree
C via equation, Trange's
job to convert and range

EXHIBIT U-3

Exhibit TEMPTM5.ASM-3

Claim 17

17. (Previously presented) An apparatus, comprising:
means for sampling a temperature associated with the operation of a processing unit within said apparatus; (A)

means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said processing unit; (B) and

means for using said prediction for automatic control of temperature within said apparatus. (C)

```
*****
: cmp     al,00h                ;Time to read data from DS?
: je      DoXBThermalRead
: *****
: dec     al
: and     ah,NOT 00h            ;Keep should stuff
: shl     al,1
: or      ah,al                ;New value
: jmp     WriteDownCountT
*****
```

DoXBThermalRead:

```

:         Try for a Thermal Management hit: return time count = 0
: then
:         we read one, with no need to leave it alone.
: *****
: call    UpdateTemperature      ;Do it
: mov     al,00h
: call    CMOSRead              ;Read Temperature byte
: mov     al,0h                 ;Direction/Time/Level
: and     ah,00h                ;Just the time and level
: please
: mov     bh,al                 ;Get the direction
: and     al,7                  ;Level computed for Temp
: range
: and     bh,110000000b         ;Direction
: cmp     ah,0                  ;Good read?
: jne     LeaveDownCountT       ;Nop, leave it alone
:
:         This is where we do some thermal management
:         Hold ah value or reset it as needed...
:
: cmp     bh,110000000b         ;Good?
: jne     NotTX_OSC             ;Nop!
```

A sample

Temperatures and control signals are returned in CMOS storage area that is read by CMOSRead program

(A) ...sampling a temperature associated with the operation of a processing unit within said apparatus

EXHIBIT I-2

EXHIBIT V

Implementation functional
For prototype and patent purposes
By 9/15/1994

Claim 17

17. (Previously presented) An apparatus, comprising:
means for sampling a temperature associated with the operation of a processing unit within said apparatus; (A)

means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said processing unit; (B) and

means for using said prediction for automatic control of temperature within said apparatus. (C)

```
*****
* cmp     al,0ah                ;Time to read data from KB?
* je      DoK8ThermalRead
*****
* dec     al
* and     ah,NOT 3ah            ;Keep theold stuff
* shl     al,2
* or      ah,al                ;New value
* jmp     WriteDownCount7

DoK8ThermalRead:
/
/   Try for a Thermal Management Hit: return time count = 0
then
/   we have one, with we need to leave it along.
/
* call    UpdateTemperature      ;Do it
* mov     al,3ah
* call    CMOSRead              ;Read Temperature byte
* and     ah,ah                 ;collection/time/Level
* and     ah,33h                ;Just the time and level
please
* mov     bh,al                 ;Set the direction
* and     al,7                  ;Level computed for Temp
range
* and     bh,11000000b          ;Direction
* cmp     ah,0                  ;Good read?
* jne     LeaveDownCount7       ;NOp, leave it along
/
/   This is where we do some thermal management
/   Hold ah value or reset it as needed...
/
* cmp     bh,11000000b          ;OSC?
* jne     NotTR_OSC             ;Nap!
```

A sample

Temperatures and
control signals are
returned in CMOS
storage area that is read
by CMOSRead program

(A) ...sampling a temperature
associated with the operation of a
processing unit within said
apparatus

EXHIBIT I-2

EXHIBIT V-1

Implementation functional
For prototype and patent purposes
By 9-15-1994

17. (Previously presented) An apparatus, comprising:
means for sampling a temperature associated with the operation of a processing unit within said apparatus; (A)

means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said processing unit; (B) and

means for using said prediction for automatic control of temperature within said apparatus. (C)

```

cmp     al,00h           ;Time to read data from MS?
je      DoSSThermalRead
shr     al,3
dec     al
and     ah,NOT 30h       ;Keep theold stuff
sbl     al,3
or      ah,al            ;New value
jap     WriteDownCount?

DoSSThermalRead:
;
;   Try for a Thermal Management hit: return time count = 0
;
then
;   we had one, else we need to leave it alone.
;
call    UpdateTemperature ;Do it
mov     al,3ah
call    CmosRead          ;Read Temperature byte
mov     ah,ah             ;Collect time/Level
and     ah,30h            ;Just the time and level
;
; please
;
mov     bh,al             ;Get the direction
and     al,7              ;Level computed for Temp
;
; range
;
and     bh,11000000b      ;Direction
;
;
cmp     ah,0              ;Good read?
jne     LeaveDownCount?   ;No, leave it alone
;
;   This is where we do some thermal management
;   Hold ah value or reset it as needed...
;
;
cmp     bh,11000000b      ;OSC?
jne     NOTTR_OSC         ;No!

```

EXHIBIT I-2

EXHIBIT V-2

Looking at direction,
prediction
Dependent on
SetTrange and storing
value in CMOS for this
read.

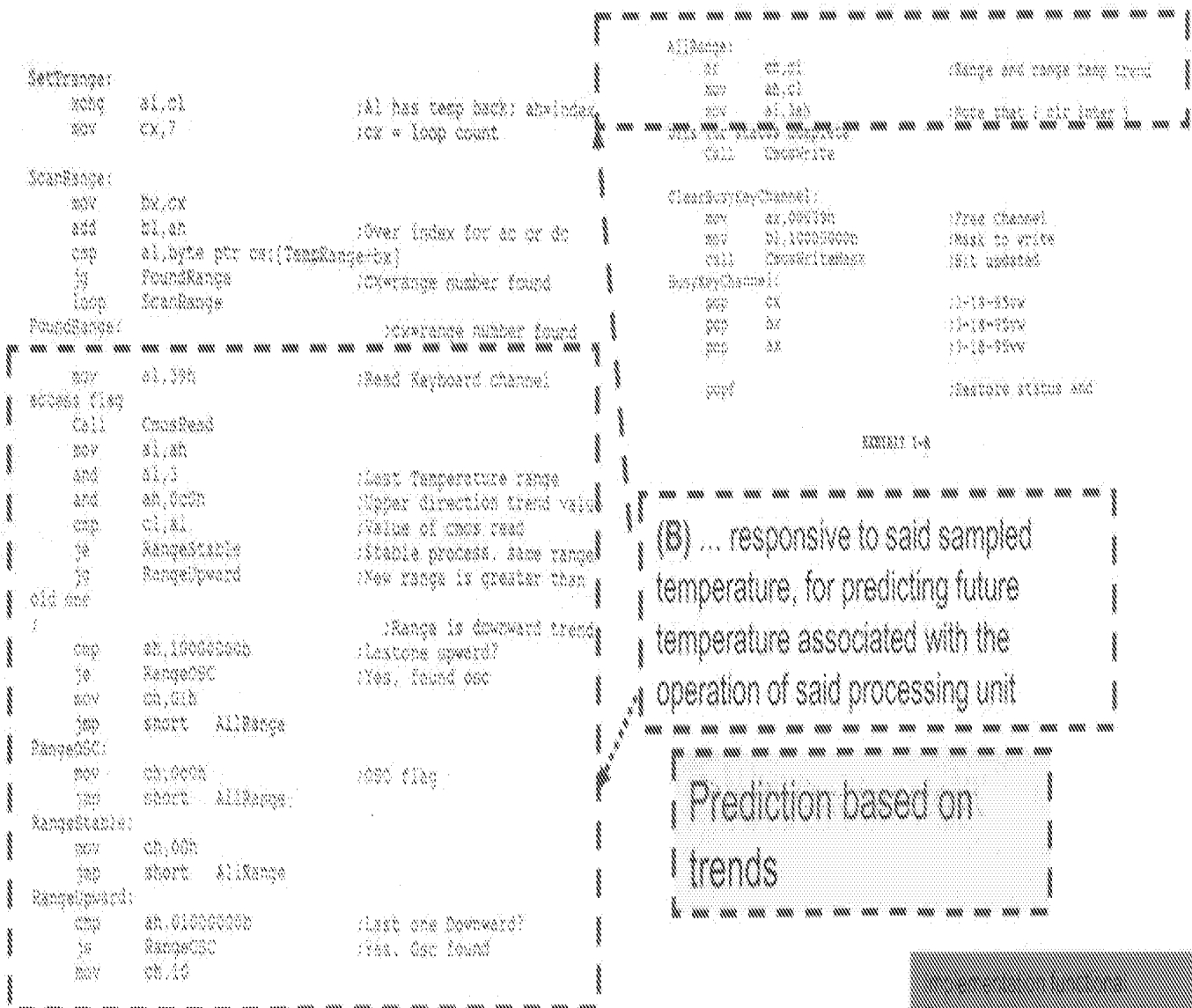
(B) ... responsive to said sampled
temperature, for predicting future
temperature associated with the
operation of said processing unit

Implementation functional
For prototype and patent purposes
By 9/15/1994

17. (Previously presented) An apparatus, comprising:
means for sampling a temperature associated with the operation of a processing unit within said apparatus; (A)

means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said processing unit; (B) and

means for using said prediction for automatic control of temperature within said apparatus. (C)



17. (Previously presented) An apparatus, comprising:
means for sampling a temperature associated with the operation of a processing unit within said apparatus; (A)

means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said processing unit; (B) and

means for using said prediction for automatic control of temperature within said apparatus. (C)

```

|-----|
|      OSC, so set the temp level up by one      |
|-----|
|      mov     bh,00000000b           ;Force downward |
|      cmp     al,7                   ;Already at max? |
|      je      NotTR_OSC              ;yep, leave alone |
|      inc     al                     ;force level temp up by one |
|      NotTR_OSC:                     |
|-----|

```

EXHIBIT I-3

```

|      Time needs to be set based on T Level      |
|-----|
|      mov     ah,7                   ;Max available |
|      sub     ah,al                  ;7-7 = 0 so watch it! |
|      cmp     ah,0                   |
|      jne     NotBig2                ;Not zero |
|      inc     ah                     ;Look at every minute |
|      NotBig2:shl     ah,2            ;Align the time constant |
|      or      ah,bh                  ;Align the direction |
|      or      ah,al                  ;Align the TRange |
|      mov     bl,al                  ;TRange |
|      mov     bh,0                   ;Upper index. |
|-----|

```

(B) ... responsive to said sampled
temperature, for predicting future
temperature associated with the
operation of said processing unit

Implementation functional
For prototype and patent purposes
By 9/15/1999

EXHIBIT V-4

17. (Previously presented) An apparatus, comprising:
means for sampling a temperature associated with the operation of a processing unit within said apparatus; (A)

means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said processing unit; (B) and

means for using said prediction for automatic control of temperature within said apparatus. (C)

TRange, direction, and time - sets auto control

OSC, so set the temp level up by one

```
mov     bh,00000000b      ;force downward
cmp     al,7              ;Already at max?
je      NotTR_OSC         ;yes, leave alone
inc     al                ;force level temp up by one
```

NotTR_OSC:

EXHIBIT I-3

Time needs to be set based on T Level

```
mov     ah,7              ;Max available
sub     ah,al             ;7-7 = 0 so watch it!
cmp     ah,0
jne     NotSigZ           ;Not zero
inc     ah               ;Look at every minute
NotSigZ:shl     ah,3       ;Align the time constant
or      ah,bh            ;Align the direction
or      ah,al            ;Align the TRange
mov     bl,al            ;TRange
mov     bh,0             ;Upper index.
```

(C) ... using said prediction for automatic control of temperature within said apparatus

EXHIBIT V-5

Implementation functional
For prototype and patent purposes
By 9/15/1991

17. (Previously presented) An apparatus, comprising:
means for sampling a temperature associated with the operation of a processing unit within said apparatus; (A)
means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said processing unit; (B) and
means for using said prediction for automatic control of temperature within said apparatus. (C)

(C) ... using said prediction for automatic control of temperature within said apparatus

```

;-----
;      Name:      Temperature Prediction
;
;      Need to setup the Dose Value based on current Temp
;
push    ax

IFDEF    zzzillyd                ;5.08.1 6-3-95w Set Dose
;-----
mov     ah,byte ptr cs/TDoseTable[0x]
mov     al,34h                  ; Index register to write
call    WriteWrite
;-----
call    zzzillyd

;-----
IFDEF    zzzillyd                ;5.08.1 6-3-95w Add dose
code here
ENDIF    zzzillyd

pop     ax                      ; Restore to next scan
WriteDownCount:
mov     al,3ah
call    CheckWrite              ; Write it out
LeaveDownCount:
pop     dx
pop     ax
popfd   ;Restore Interrupts
ret
;-----

```

Modifies clock signal – that controls temperature of apparatus. Register BX indexes TDoseTable for auto-selection and auto control.

Note:

This is original code that was present in FCC and UL code or before 9/15/94 – IFDEF zzzillyd was added on 6-3-95 to delineate original code from any new code added later for IFDEF zzzillyd

Note: The Macro "IFDEF" was added on 6-3-95 because This code was used for another Product also called lilyd. The original code that was Working by 9/15/94 is there, the Macro for lilyd does not have Any code generation as of yet Here since it was not written for The new product. As faster processors were added to lilyd products, the tables changed to under them also (see 4.48b 5-11-95)

```

;-----
TDoseTable:
db      00h                ; Disabled
db      30h                ; 2 sec's
db      30h                ; 1 sec
db      30h                ; 1/2 sec
db      20h,20h,20h,20h,20h ; 4.48b 5-11-95
;-----
;      db      20h                ; 1/4 sec
;-----

```

EXHIBIT I-3

EXHIBIT V-6

Implementation functional
For prototype and patent purposes
By 9/15/94

Claim 18

18. (Previously presented) An apparatus, comprising:

means for sampling a temperature associated with the operation of said apparatus; (A)

means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said apparatus; (B) and means for using said prediction for automatic temperature control within said apparatus. (C)

```
*****
: cmp    al,08h                ;Time to read data from KS?
: je     DoKSThermalRead
*****
: mov    al,7
: dec    al
: and    ah,NOT 3ah            ;Keep the old stuff
: shl    al,3
: or     ah,al                  ;New value
: jmp    WriteDownCountT

DoKSThermalRead:
:
:   Try for a Thermal Management hit: return time count = 0
: then
:   We can say, also we want to leave it alone.
*****
: call   UpdateTemperature      ;Do it
: mov    al,7ah
: call   CMOSRead               ;Read Temperature byte
: mov    al,7ah                ;Direction/Time/Level
: and    ah,3ah                ;Just the time and level
: please
: mov    bh,al                  ;Get the direction
: and    al,7                   ;Level computed for Temp
: range
: and    bh,11000000b           ;Direction
: cmp    ah,0                   ;Good read?
: jne    LeaveDownCountT        ;Nop, leave it alone
:
:   This is where we do some thermal management
:   Hold ah value or reset it as needed...
:
: cmp    bh,11000000b           ;OSC?
: jne    NOTR_OSC               ;Nop!
```

EXHIBIT I-2

EXHIBIT V-7

A sample

Temperatures and control signals are returned in CMOS storage area that is read by CMOSRead program

(A) ...sampling a temperature associated with the operation of a processing unit within said apparatus

Implementation functional
For prototype and patent purposes
By 3/15/1994

18. (Previously presented) An apparatus, comprising:

means for sampling a temperature associated with the operation of said apparatus; (A)

means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said apparatus; (B) and means for using said prediction for automatic temperature control within said apparatus. (C)

```
cmp    al,06h           ;Time to read data from EP?
je      DoXBThermalRead
shr     al,3
dec     al
and     ah,NOT 18h       ;Keep the old stuff
shl     al,3
or      ah,al            ;New value
jmp     WriteDownCountT
```

DoXBThermalRead:

```

;
; Try for a Thermal Management hit: return time count = 0
; then
; we had one, else we need to leave it alone.
;
call    UpdateTemperatures ;Do it
mov     al,3ah
call    CMOSRead           ;Read Temperature byte
mov     ah,ah              ;Direction/Time/Level
and     ah,18h             ;Just the time and level
```

```

; please
;
mov     bh,al              ;Get the direction
and     al,7               ;Level computed for Temp
range
and     bh,11000000b       ;Direction
;
cmp     ah,0               ;Good read?
jne     LeaveDownCountT    ;No, leave it alone
```

```

; This is where we do some thermal management
; Hold ah value or reset it as needed...
;
cmp     bh,11000000b       ;OSC?
jne     NotTR_OSC          ;No!
```

EXHIBIT I-2

EXHIBIT V-8

Looking at direction,
prediction
Dependent on
SetTrange and storing
value in CMOS for this
read.

(B) ... responsive to said sampled
temperature, for predicting future
temperature associated with the
operation of said apparatus

Implementation functional
For prototype and patent purposes
By 9/15/1994

18. (Previously presented) An apparatus, comprising:

means for sampling a temperature associated with the operation of said apparatus; (A)

means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said apparatus; (B) and means for using said prediction for automatic temperature control within said apparatus. (C)

```
SetRange:
    xchg    al,cl                ;Al has temp back; swap index
    mov     cx,7                ;cx = loop count

ScanRange:
    mov     dx,cx
    add     bl,ah                ;Over index for ac or dc
    cmp     al,byte ptr cs:[TempRange+bx]
    js      FoundRange          ;cx=range number found
    loop    ScanRange

FoundRange:
    ;overrange number found
    .....
    mov     al,3fh              ;Read keyboard channel
    cld
    call    CmdsRead
    mov     al,ah
    and     al,1                ;Last Temperature Range
    and     ah,000h              ;Upper direction trend value
    cmp     al,al                ;Value of cmd read
    js      RangeStable         ;Stable process, same range
    jg      RangeUpward         ;New range is greater than
    old one
    ;
    ;Range is downward trend
    cmp     ah,100000000h        ;Last one upward?
    js      RangeOSC            ;Yes, found osc
    mov     ch,01h
    jmp     short AllRange

RangeOSC:
    mov     ch,000h              ;OSC flag
    jmp     short AllRange

RangeStable:
    mov     ch,00h
    jmp     short AllRange

RangeUpward:
    cmp     ah,010000000h        ;Last one downward?
    js      RangeOSC            ;Yes, Osc found
    mov     ch,10
    .....

AllRange:
    or      ch,cl                ;Range and range temp trend
    mov     ah,cl
    mov     al,3ah              ;Write char 1 dir index
    .....
    call    CmdsWrite

ClearTempKeyChannel:
    mov     ax,00070h            ;Free Channel
    mov     bx,100000000h        ;Mask to write
    call    CmdsWriteMask
    ;Bit updated

PushKeyChannel:
    pop     dx                  ;1-13-95mv
    pop     bx                  ;1-18-95mv
    pop     ax                  ;1-18-95mv

    jmp     .....              ;Restore status and

*****
(B) ... responsive to said sampled
temperature, for predicting future
temperature associated with the
operation of said apparatus

*****
Prediction based on
trends
*****

*****
Implementation disclosed
for prototype and patent purposes
*****
```

18. (Previously presented) An apparatus, comprising:

means for sampling a temperature associated with the operation of said apparatus; (A)

means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said apparatus; (B) and means for using said prediction for automatic temperature control within said apparatus. (C)

```

-----
:      OSC, so set the temp level up by one
:
:      mov     bh,00000000b      ;Force downward
:      cmp     al,7              ;Already at max?
:      ja      NotTR_OSC        ;yes, leave alone
:      inc     al                ;force level temp up by one
: NotTR_OSC:
-----

EXHIBIT I-3      Time needs to be set based on T Level
:
:      mov     ah,7              ;Max available
:      sub     ah,al             ;?-? = 0 so watch it!
:      cmp     ah,0
:      jne     NotSigZ          ;Not zero
:      inc     ah               ;Look at every minute
: NotSigZ: shl     ah,3          ;Align the time constant
:      or      ah,bh            ;Align the direction
:      or      ah,al            ;Align the TRange
:      mov     bl,al            ;TRange
:      mov     bh,0             ;Upper index.
:
:
-----
```

(B) ... responsive to said sampled
temperature, for predicting future
temperature associated with the
operation of said apparatus

EXHIBIT V-10

Implementation functional
For prototype and patent purposes
By 9/15/1994

18. (Previously presented) An apparatus, comprising:

means for sampling a temperature associated with the operation of said apparatus; (A)

means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said apparatus; (B) and means for using said prediction for automatic temperature control within said apparatus.(C)

TRange, direction, and time - sets auto control

```
;
; OSC, so set the temp level up by one
;
mov     bh,50000000b      ;force downward
cmp     al,7              ;Already at max?
je      NotTR_OSC         ;yes, leave alone
inc     al                ;force level temp up by one
NotTR_OSC:
```

EXHIBIT I-3

```
; Time needs to be set based on T Level
;
mov     ah,7              ;Max available
sub     ah,al             ;7-7 = 0 so watch it!
cmp     ah,0
jne     NotSigZ           ;Not zero
inc     ah               ;look at every minute
NotSigZ:shl     ah,3       ;Align the time constant
or      ah,bh            ;Align the direction
or      ah,al            ;Align the TRange
mov     bl,al            ;TRange
mov     bh,0             ;Upper index.
```

(C) ... using said prediction for automatic control of temperature within said apparatus

EXHIBIT V-11

Implementation functional
For prototype and patent purposes
By 9/15/1994

18. (Previously presented) An apparatus, comprising:

means for sampling a temperature associated with the operation of said apparatus; (A)

means, responsive to said sampled temperature, for predicting future temperature associated with the operation of said apparatus; (B) and means for using said prediction for automatic temperature control within said apparatus. (C)

(C) ... using said prediction for automatic control of temperature within said apparatus

```

; Need to setup the Dose Value based on current TRange
push    ax

IFDEF  zzzlilyd                                15.08.1 6-3-95W Set Dose
; Dose
mov     ah,byte ptr cs:TDozeTable[bx]
mov     al,54h                                ; Index register to write
call    WriteWrite
ENDIF  zzzlilyd

```

Modifies clock signal -- that controls temperature of apparatus. Register BX indexes TDozeTable for auto-selection and auto control.

```

IFDEF  zzzlilyd                                15.08.1 6-3-95W Add dose
; Dose here
ENDIF  zzzlilyd

pop     ax
WriteDownCount()
mov     al,1ah
call    OneWrite                                ; Write it out
LeaveDownCount()
pop     bx
pop     ax
popfd                                ; Restore interrupts
ret

```

Note:

This is original code that was present in FCC and UL code or before 9/15/94 -- IFDEF zzzlilyd was added on 6-3-95 to delineate original code from any new code added later for IFDEF zzzlilyd

Note: The Macro "IFDEF" was added on 6-3-95 because This code was used for another Product also called lilyd. The original code that was Working by 9/15/94 is there, the Macro for lilyd does not have Any code generation as of yet Here since it was not written for The new product. As faster processors were added to lilyd products, the tables changed to under them also (see 4.48b 5-11-95)

```

; TDozeTable:
db      00h                                ; Disabled
db      30h                                ; 1 sec's
db      10h                                ; 1 sec
db      20h                                ; 1/2 sec
db      20h,20h,20h,20h,20h              ; 4.48b 5-11-95
; db      20h                                ; 1/4 sec

```

EXHIBIT V-3

EXHIBIT V-12

Implementation functional
For prototype and patent purposes
By 9/15/1994

Claims 19 and 20

19. (Previously presented) The apparatus of Claim 17, including means for user modification of said temperature predictions. (D)

20. (Previously presented) The apparatus of Claim 18, including means for user modification of said temperature predictions. (D)

Auto/on/off set by user in SETUP

Implementation functional
For prototype and patent purposes
By 3-24-1995

```
Smart range coded added 3-12-95vw
Allow user to select which range of thermal management he
wants
Power Saving = ON --DC range
               OFF --AC range
               AUTO -If AC operation, using AC range
                   -If DC operation, using DC range
```

(D) The apparatus ... including means for user modification of said temperature predictions

EXHIBIT I-7

3-24-95 Added Auto/On/off selection

```
mov     al,66h
call    CmosRead          ;Get Auto/On/Off Selection
```

Note: this feature was added after code was converted to ROM based needed for production as an enhancement to technology in Mar 1995. Dischler did NOT provide auto selection by user.

Claim 21

21. (Previously presented) An apparatus, comprising:

means for sampling a temperature within said apparatus (A) and, using said sampled temperature at least once as a starting point, (E) predicting future changes in said temperature; (B) and means, responsive to said means for sampling and predicting, for automatically adjusting the processing speed of a processing unit by modifying a clock signal utilized by the processing unit, (C) to maintain said temperature within said apparatus below a selected reference temperature. (F)

```
*****
:   cmp     al,0FFh           ;Time to read data from XT?
:   je      DoXBThermalRead
*****
:   mov     bh,7
:   dec     al
:   and     ah,NOT 16h        ;Keep the old stuff
:   shl     al,3
:   or      ah,al             ;New value
:   jmp     WriteDownCountT

DoXBThermalRead:
:
:   ; Try for a Thermal Management bit; return time count = 0
:   then
:   ; We had one, and we need to leave it alone.
:
:   call    UpdateTemperature ;Do it
:   mov     al,16h
:   call    CMOSRead          ;Read Temperature byte
:   mov     bh,16h            ;Direction/Time/Level
:   and     ah,16h            ;Just the time and level
:   please
:   mov     bh,al             ;Get the direction
:   and     al,7               ;Level computed for Temp
:   range
:   and     bh,11000000b       ;Direction
:
:   cmp     ah,0               ;Good read?
:   jne     LeaveDownCountT    ;Nop, leave it alone
:
:   ; This is where we do some thermal management
:   ; Hold ah value or reset it as needed...
:
:   cmp     bh,11000000b       ;OSC?
:   jne     NotTR_OSC          ;Nop!
```

EXHIBIT I-2

EXHIBIT V-14

A sample

Temperatures and control signals are returned in CMOS storage area that is read by CMOSRead program

(A) ... sampling a temperature within said apparatus

Implementation functional
For prototype and patent purposes
By 9/15/1994

21. (Previously presented) An apparatus, comprising:

means for sampling a temperature within said apparatus (A) and, using said sampled temperature at least once as a starting point, (E) predicting future changes in said temperature; (B) and means, responsive to said means for sampling and predicting, for automatically adjusting the processing speed of a processing unit by modifying a clock signal utilized by the processing unit, (C) to maintain said temperature within said apparatus below a selected reference temperature. (F)

```

;Time to read data from XBP
mov     al,00h
je      DoXBTThermalRead
shr     al,1
dec     al
and     ah,NOT 00h      ;Keep threshold stuff
shl     al,2
or      ah,al           ;New value
jgq     WriteDownCountT

```

DoXBTThermalRead:

```

;
; Try for a Thermal Management hit: return time count = 0
; then
;
; We read data, but we need to leave it alone.
;

```

```

;
; call    UpdateTemperature      ;Do it
; mov     al,00h
; call    CmosRead              ;Read Temperature byte
; mov     al,00h                ;POLYFACTION/TIME/LEVEL
; and     ah,10h                ;Just the time and level
; please
; mov     bh,al                 ;Get the direction
; and     al,7                  ;level computed for Temp
; range
; and     bh,110000000b         ;Direction
;
; cmp     ah,0                  ;Good read?
; jre     LeaveDownCountT       ;Nop, leave it alone
;

```

```

; This is where we do some thermal management
; Hold ah value or reset it as needed...
;
; mov     bh,110000000b         ;OSC?
; jne     NoTR_OSC              ;Nop!

```

(E) using said sampled temperature at least once as a starting point

Sampled Temperature
Returned in CMOS Storage area.
Read CMOS storage to fetch sample point
(also returns "trends" found with sample point for later prediction)

Valid sampled temperature

EXHIBIT I-2

EXHIBIT V-15

Implementation functional
For prototype and patent purposes
By 9/15/1994

21. (Previously presented) An apparatus, comprising:

means for sampling a temperature within said apparatus (A) and, using said sampled temperature at least once as a starting point, (E) predicting future changes in said temperature; (B) and means, responsive to said means for sampling and predicting, for automatically adjusting the processing speed of a processing unit by modifying a clock signal utilized by the processing unit, (C) to maintain said temperature within said apparatus below a selected reference temperature. (F)

```

SetRange:
    mov     al,cl          ;Al has temp back; ah=index
    mov     cx,7           ;cx = loop count

ScanRange:
    mov     bx,cx
    add     bi,ah           ;Over index for ax or dx
    cmp     al,byte ptr ds:[TempRange+bx]
    jn      FoundRange     ;cx=range number found
    loop    ScanRange

FoundRange:
    ;cx=range number found

    mov     al,37h         ;Read Keyboard channel
    outsb   flag
    call    CmosRead
    mov     al,ah
    and     al,3           ;last Temperature range
    and     ah,0c0h        ;Upper direction trend value
    cmp     cl,al          ;Value of cmos read
    je      RangeStable    ;Stable process, same range
    jg      RangeUpward    ;New range is greater than

;Range is downward trend
;Last one upward?
    cmp     ah,10000000b
    je      RangeOSC       ;Yes, found osc
    mov     ch,01h
    jmp     short AllRange

RangeOSC:
    mov     ch,0c0h        ;OSC flag
    jmp     short AllRange

RangeStable:
    mov     ch,00h
    jmp     short AllRange

RangeUpward:
    cmp     ah,01000000b    ;Last one Downward?
    je      RangeOSC       ;Yes, Osc found
    mov     ch,10

```

(E) using said sampled temperature at least once as a starting point

Temperature sensor
Programmed as smart sensor
E2, 27C010

Sampled Temperature
Returned in CMOS Storage area in register AL.

Prediction Work
based on sample
as starting point

Exhibit I-6

EXHIBIT V-16

21. (Previously presented) An apparatus, comprising:

means for sampling a temperature within said apparatus (A) and, using said sampled temperature at least once as a starting point, (E) predicting future changes in said temperature; (B) and means, responsive to said means for sampling and predicting, for automatically adjusting the processing speed of a processing unit by modifying a clock signal utilized by the processing unit, (C) to maintain said temperature within said apparatus below a selected reference temperature. (F)

```
cmp    al,00h           ;Time to read data from K8?
je     DoK8ThermalRead
shr    al,3
dec    al
and    ah,NOT 30h       ;Keep theold stuff
shl    al,3
or     ah,al            ;New value
jmp    WriteDownCountT
```

```
DoK8ThermalRead:
;
; Try for a Thermal Management bit; return time count = 0
then
; we had one, else we need to leave it alone.
;
```

```
call   UpdateTemperature ;Do it
mov     al,30h
call   CmosRead          ;Read Temperature byte
mov     ah,ah             ;Direction,Time/Level
and     ah,30h           ;Just the time and level
; please
mov     bh,al             ;Get the direction
and     al,7             ;Level computed for Temp
range
and     bh,11000000b     ;Direction
;
cmp     ah,0             ;Good read?
jne     LeaveDownCountT  ;No; leave it alone
```

```
; This is where we do some thermal management
; Hold ah value or reset it as needed...
;
cmp     bh,11000000b     ;35C?
jne     NotTR_USC       ;No!
```

Looking at direction,
prediction
Dependent on
SetTrange and storing
value in CMOS for this
read.

(B) ... predicting future changes in said
temperature

Implementation functional
For prototype and patent purposes
By 9/15/1994

EXHIBIT I-2

EXHIBIT V-17

21. (Previously presented) An apparatus, comprising:

means for sampling a temperature within said apparatus (A) and, using said sampled temperature at least once as a starting point, (E) predicting future changes in said temperature; (B) and means, responsive to said means for sampling and predicting, for automatically adjusting the processing speed of a processing unit by modifying a clock signal utilized by the processing unit, (C) to maintain said temperature within said apparatus below a selected reference temperature. (F)

```

SetRange:
    mov     al,cl                ;Al has temp back; al=range
    mov     cx,7                ;cx = loop count

ScanRange:
    mov     bx,cx
    add     si,ah                ;Over index for ax, ay, az
    cmp     al,byte ptr cs:[TempRange+bx]
    jg      FoundRange          ;cy-range number found
    loop    ScanRange

FoundRange:
    ;cx=range number found

    mov     al,10h              ;Read Keyboard Channel
    scasd   flag
    call    CmosRead
    mov     al,ah
    and     al,3                ;Last Temperature range
    and     ah,0c0h              ;Upper direction trend value
    cmp     cl,al                ;Value of cmos read
    je      RangeStable         ;Stable process, same range
    jg      RangeUpward         ;New range is greater than
    ;old one

    ;Range is downward trend
    cmp     ah,10000000h         ;Last one upward?
    je      RangeOSC            ;Yes, found osc
    mov     ch,01h
    jmp     short AllRange

RangeOSC:
    mov     cx,0c0h              ;OSC flag
    jmp     short AllRange

RangeStable:
    mov     ch,00h
    jmp     short AllRange

RangeUpward:
    cmp     ah,01000000h         ;Last one downward?
    je      RangeOSC            ;Yes, Osc found
    mov     ch,10
    
```

```

AllRange:
    or      ch,al                ;Range and range temp trend
    mov     ah,cl
    mov     si,10h              ;Store that I did later
    call    CmosWrite

ClearBusyKeyChannel:
    mov     ax,00010h           ;free channel
    mov     si,10000000h         ;Mask to write
    call    CmosWrite

BusyKeyChannel:
    pop     cx                  ;1-10-0000
    pop     bx                  ;1-10-0000
    pop     ax                  ;1-10-0000

    popf                         ;Restore xstatus and
    
```

EXHIBIT V-8

(B) ... predicting future changes in said temperature

Prediction based on trends

EXHIBIT V-18

Information furnished
herein is for official use only and is not to be
distributed outside the agency.

21. (Previously presented) An apparatus, comprising:

means for sampling a temperature within said apparatus (A) and, using said sampled temperature at least once as a starting point, (E) predicting future changes in said temperature; (B) and means, responsive to said means for sampling and predicting, for automatically adjusting the processing speed of a processing unit by modifying a clock signal utilized by the processing unit, (C) to maintain said temperature within said apparatus below a selected reference temperature. (F)

EXHIBIT I-3

```
-----
:      OSC, so set the temp level up by one      |
:  ;                                             |
:  mov    bh,00000000b      ;Force downward      |
:  cmp    al,7              ;Already at max?      |
:  je     NotTR_OSC        ;yep, leave alone      |
:  inc    al                ;force level temp up by one |
:  NotTR_OSC:-----
```

```
Time needs to be set based on T level
:
:  mov    ah,7              ;Max available
:  sub    ah,al              ;7-7 = 0 so watch it!
:  cmp    ah,0
:  jne    NotBig2           ;Not zero
:  inc    ah                ;Look at every minute
:  NotBig2:shl    ah,1       ;Align the time constant
:  or     ah,bh             ;Align the direction
:  or     ah,al             ;Align the TRange
:  mov    bl,al             ;TRange
:  mov    bh,0              ;Upper index.
```

```
-----
:  (B) ... predicting future changes in said |
:  temperature                               |
:  -----
```

EXHIBIT V-19

Implementation functional
For prototype and patent purposes
By 9/15/1994

21. (Previously presented) An apparatus, comprising:

means for sampling a temperature within said apparatus (A) and, using said sampled temperature at least once as a starting point, (E) predicting future changes in said temperature; (B) and means, responsive to said means for sampling and predicting, for automatically adjusting the processing speed of a processing unit by modifying a clock signal utilized by the processing unit, (C) to maintain said temperature within said apparatus below a selected reference temperature. (F)

TRange, direction, and time - sets auto control

```

;
; OSC, so set the temp level up by one
;
mov     bh,00000000b           ;force downward
cmp     al,7                   ;Already at max?
je      NotTR_OSC              ;yep, leave alone
inc     al                     ;force level temp up by one

```

NotTR_OSC:

EXHIBIT I-3

```

; Time needs to be set based on F level
;
mov     ah,7                   ;Max available
sub     ah,al                   ;7-7 = 0 so watch it!
cmp     ah,0
jne     NotBig2                ;Not zero
inc     ah                     ;Lock at every minute
NotBig2:shl     ah,3             ;Align the time constant
or      ah,bh                   ;Align the direction
or      ah,al                   ;Align the TRange
mov     dl,al                   ;TRange
mov     bh,0                   ;Upper index.

```

(C) ... responsive to said means for sampling and predicting, for automatically adjusting the processing speed of a processing unit by modifying a clock signal utilized by the processing unit,

means for sampling a temperature within said apparatus (A) and, using said sampled temperature at least once as a starting point, (E) predicting future changes in said temperature; (B) and means, responsive to said means for sampling and predicting, for automatically adjusting the processing speed of a processing unit by modifying a clock signal utilized by the processing unit, (C) to maintain said temperature within said apparatus below a selected reference temperature. (F)

[illegible]

This is original code that was present in FCC and UL code or before 9/15/94 - IFDEF zzzlllyp was added on 6-3-95 to delineate original code from any new code added later for IFDEF zzzlllyp

```

Therefore:
do 000 ; Disabled
do 100 1 1 sec's
do 200 2 1 sec
do 250 3 1 1/2 sec
do 300,350,400,450,500 4x,450 5-11-95
; do 200 3 1/4 sec

```

EXHIBIT V-21

Implementation functional
For prototype and patent purposes
By 9/15/1994

21. (Previously presented) An apparatus, comprising:

means for sampling a temperature within said apparatus (A) and, using said sampled temperature at least once as a starting point, (E) predicting future changes in said temperature; (B) and means, responsive to said means for sampling and predicting, for automatically adjusting the processing speed of a processing unit by modifying a clock signal utilized by the processing unit, (C) to maintain said temperature within said apparatus below a selected reference temperature. (F)

(F) maintain said temperature within said apparatus below a selected reference temperature.

Sets Value to keep temperature below referenced in table

```

GetRange:
    schg    al,cl                ;Al has temp back: sh-index
    mov     cx,7                ;cx = loop count

ScanRange:
    mov     bx,cx
    add     si,sh                ;Over index for sc or dc
    cmp     al,byte ptr ds:[TempRange+bx]
    jg      FoundRange          ;CX=range number found
    loop    ScanRange

FoundRange:
                                ;CX=range number found

    mov     al,30h              ;Read Keyboard channel
    cld
    call    CmosRead
    mov     al,ah
    and     al,1                ;Last Temperature range
    and     ah,000h             ;Upper direction trend value
    cmp     cl,al               ;Value of cmos read
    je      RangeStable         ;Stable process, same range
    jg      RangeUpward         ;New range is greater than

old mov
                                ;Range is downward trend
    cmp     ah,10000000h        ;Last one upward?
    je      RangeDEC            ;Yes, found dec
    mov     ch,01h
    jmp     short AllRange

RangeDEC:
    mov     ch,000h             ;DEC flag
    jmp     short AllRange

RangeStable:
    mov     ch,00h
    jmp     short AllRange

RangeUpward:
    cmp     ah,01000000h        ;Last one Downward?
    je      RangeDEC            ;Yes, Dec found
    mov     ch,10
        
```

```

AllRange:
    or      ch,cl               ;Range and range temp trend
    mov     ah,cl
    mov     al,5ah              ;Write what I bit in my 2
    bnt     for status complete
    call    CmosWrite

ClearDataKeyChannel:
    mov     ax,04000h           ;Free Channel
    mov     si,10000000h        ;Mask to write
    call    CmosWriteMask      ;Bit updated

BusyKeyChannel:
    pop     cx                  ;1-10-0000
    pop     bx                  ;1-10-0000
    pop     ax                  ;1-10-0000

    jmp     RestoreStatusAnd
        
```

EXHIBIT V-22

EXHIBIT V-23

TempRange	label	byte
00TempRange	label	byte
00	00h	Level 0
01	01h	Level 1
02	02h	Level 2
03	03h	Level 3
04	04h	Level 4
05	05h	Level 5
06	06h	Level 6
07	07h	Level 7

AC2TempRange	label	byte
00	00h	Level 0
01	01h	Level 1
02	02h	Level 2
03	03h	Level 3
04	04h	Level 4
05	05h	Level 5
06	06h	Level 6
07	07h	Level 7

UpdateTemperature endp

EXHIBIT V-23

Claim 23

23. (Previously presented) The apparatus of Claim 21, wherein said adjustments are accomplished within the processing unit cycles and do not affect the user's perception of performance. (G)

```

    cmp     al,0x00          ;Time to read from 0x0
    je      ReadThermalRead
    shr     al,1
    dec     al
    and     ah,NOT 100       ;Keep threshold stuff
    and     al,1
    or      ah,al            ;New value
    jmp     WriteDownCount7

;-----
ReadThermalRead:
;
; Try for a Thermal Management bit: return time count = 0
; then
; we had one, else we need to leave it along.
;
    call    UpdateTemperature ;Ok it
    mov     al,100
    call    CheckRead         ;Read Temperature byte
    mov     al,00             ;Direction/Time/Level
    and     ah,100            ;Just the time and level
;please
    mov     bh,al             ;Get the direction
    and     al,7              ;Level computed for Temp
;range
    and     bh,1100000000     ;Direction

    cmp     bh,0              ;Good read?
    jne     LeaveDownCount7   ;No, leave it along

;
; This is where we do some thermal management
; hold ah value or reset it as needed...
;
    cmp     bx,1100000000     ;00C7
    jne     NOTTR_RST         ;No!

```

Abstract

Sample interval selected as to not be detected by user or affect user performance

```

mov     ax, 0000h      ; Minutes to next scan
WriteTimeCount:
mov     ax, 1ah
call    CrcWrite       ; Write it out
WriteTimeCount:
mov     ax, 0000h
mov     ax, 0000h
push    ax              ; Restore Interrupts
ret

TheaterTable:
db      00h             ; Disabled
db      10h             ; 1 sec's
db      10h             ; 1 sec
db      00h             ; 1/2 sec
db      10h, 20h, 30h, 40h  ; 1, 2, 3, 4 sec
; db      00h             ; 1/4 sec

```

RESULTS

(G) ... said adjustments are accomplished within the processing unit cycles and do not affect the user's perception of performance.

PROSTATECTOMY OUTCOME
FOR PATIENTS WITH CLINICAL STAGE T1c

23. (Previously presented) The apparatus of Claim 21, wherein said adjustments are accomplished within the processing unit cycles and do not affect the user's perception of performance. (G)

(G) ... said adjustments are accomplished within the processing unit cycles and do not affect the user's perception of performance.

Thermal Management Event -

```

ThermalManagementEvent
File Edit View Insert Format Help
[Icons]

timer_exit:
    pop    ax
    pop    cx
    jmp     [?]

; Time for Thermal Management?

mov     ax,ThermalSlice,TALICE0
je      BtInitSlice           ; Heat okay
dec     ax,TimeThermalSlice
jne     BtInitSlice           ; Not our time

; return for our slice

pushf
; Status

pushf
push     ax
push     offset ThermalSuspend ; By ax
pop      BtSuspend
BtInitSlice:
    popf
    BtTransfer:
        jmp     casedown jnz tpe_timer ; do other timed timer routines

For help, press F1

```

forcing cool down loop – really a "one shot" since CX=1

Sample interval selected as to not be detected by user or affect user performance

```

BA.ASM - WordPad
File Edit View Insert Format Help
[Icons]

ThermalSlice      db    TALICE0
TimeThermalSlice  db    0
BtTempdebug       db    0AAh

ThermalSuspend:
    pushf
    push     ds
    push     cs
    pop      ds

    pusha

    MOV     cx,1

BtOutsideHeatLoop:
    call    force_sleep
    sti
    nop
    hlt

loop     BtOutsideHeatLoop

mov     al,ThermalSlice
mov     TimeThermalSlice,al

popa

pop     ds
popf
iret

For help, press F1

```

Exhibit BA.ASM-5

Claim 74

74. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (P)

```

.....
(T) a temperature controller ...
.....
DoKBThermalRead:
:
:   Try for a Thermal Management hit: return time count = 0
:   then
:       we had one, else we need to leave it along.
:
:   .....
:   call    UpdateTemperature    ;Do it
:   mov     al,1ah
:   call    CmosRead              ;Read Temperature byte
:   mov     al,ah                 ;Direction/Time/Level
:   and     ah,03h                ;Just the time and level
:   please
:   mov     bh,al                ;Get the direction
:   and     al,7                 ;Level computed for Temp
:   range
:   and     bh,11000000b         ;Direction
:   cmp     ah,0                 ;Good read?
:   jne     LeaveDownCountT      ;No, leave it along
:
:   This is where we do some thermal management
:   Hold ah value or reset it as needed...
:
:   cmp     bh,11000000b
:   jne     NotTR_OSC
:
:   .....

```

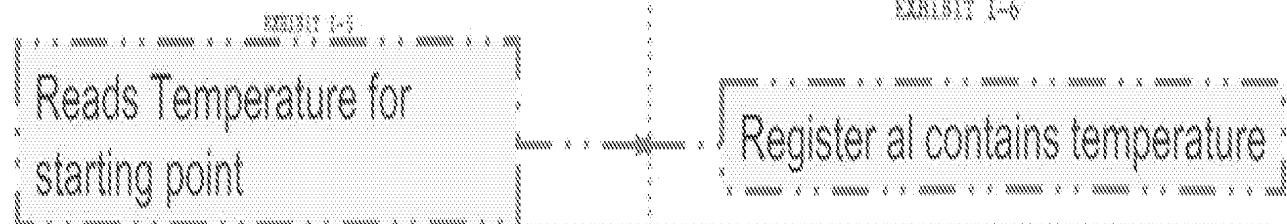
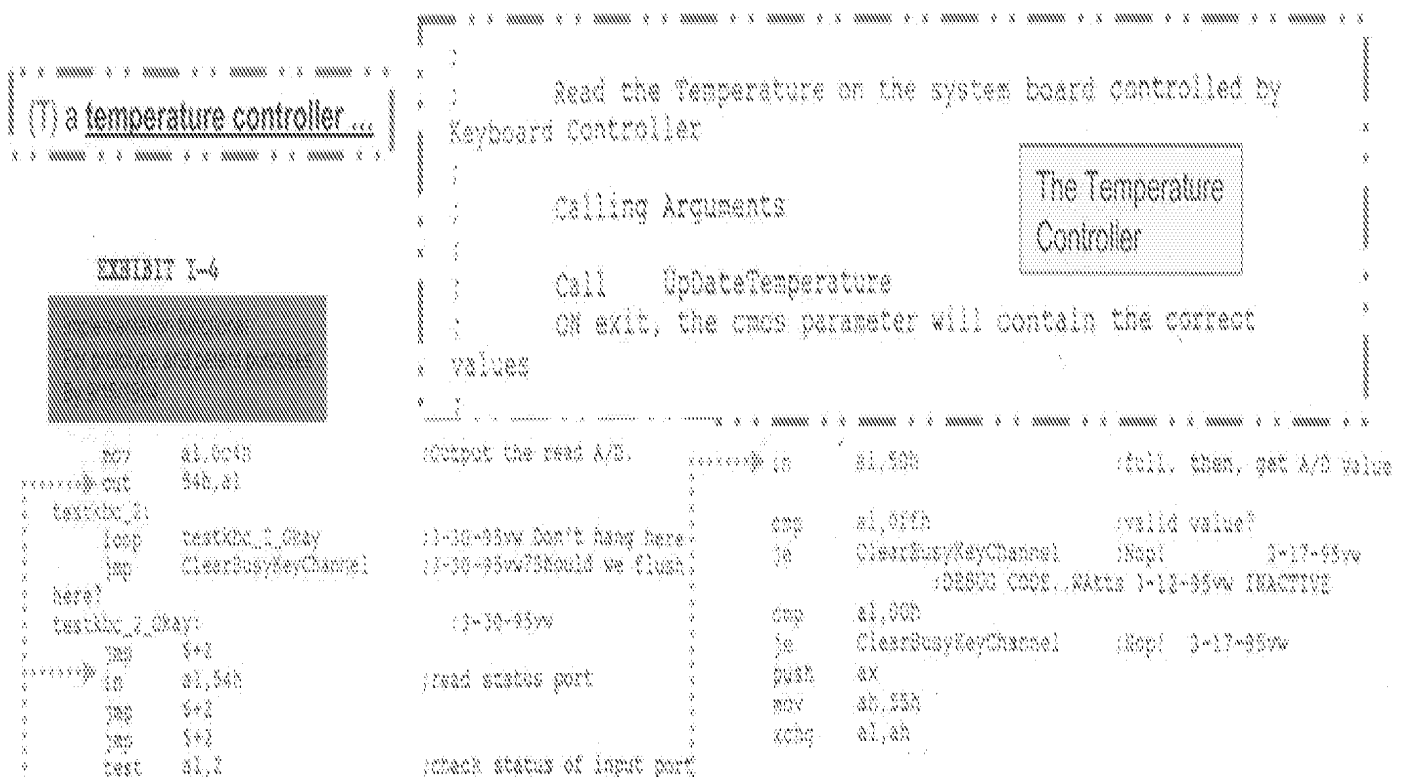
DoKBThermalRead
calls
Temperature Controller:
"UpdateTemperature"

memory location
for processing unit
B. 11000000b

74. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (P)



Note: Channels 64 was changed to 54 and 60 was changed to 50 after 9/15/94. Does not affect invention, just make product work better for multitasking operating systems. Same temperature was obtained either way. Channels 60 and 64 used for FCC and UL agency testing. Implementation was functional and complete for patent purpose by 9/15/94.

74. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (P)

```
cmp    al,00h           ;Time to read data from KS?
je     DoKSThermalRead
shr    al,3
dec    al
and    ah,NOT 10h       ;Keep threshold stuff
shl    al,3
or     ah,al            ;New value
jap    WriteDownCountT
```

DoKSThermalRead:

```

;
; Try for a Thermal Management hit: return time count = 0
;
Then
```

~~;; HAD ONE. TIME WE NEED TO LEAVE IT ALONG.~~

```
call    UpdateTemperature ;Do it
mov     al,3ah
call    CMOSRead          ;Read Temperature byte
mov     al,ah              ;TIME/DIR/TIME/LEVEL
and     ah,30h            ;Just the time and level
```

```
pleads
mov     bh,al              ;Get the direction
and     al,7              ;Level computed for Temp
```

```
range
and     bh,11000000b      ;direction

cmp     ah,0              ;Good read?
jne     LeaveDownCountT   ;Nop, leave it along
```

```

; This is where we do some thermal management
; Hold ah value or reset it as needed...
;
```

```
cmp     bh,11000000b      ;OSC?
jne     NotTR_OSC         ;Nop!
```

EXHIBIT I-2

Valid sampled temperature

(E) ... using said sampled temperature at least once as a starting point

Sampled Temperature
Returned in CMOS Storage area.
Read CMOS storage to fetch sample point
(also returns "trends" found with sample point for later prediction)

Implementation functional
For prototype and patent purposes
By 9/15/1994

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

(E) using said sampled temperature at least once as a starting point

Expenditures
For purchase of new pictures
\$ 375.00

Prediction Work
based on sample
as starting point

EXHIBIT V-28

74. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (P)

```
    cmp     al,08h           ;Time to read data from 82?
    je      DoK8ThermalRead
    shr     al,3
    dec     al
    and     ah,NOT 18h       ;Keep the old stuff
    sbi     ai,3
    or      ah,al            ;New value
    jmp     WriteDownCountT
```

DoK8ThermalRead:

```
    ;
    ; Try for a Thermal Management hit: return time count = 0
    ; then
    ; we had one, else we need to leave it alone.
    ;
```

```
    call    UpdateTemperature ;Do it
    mov     al,3ah
    call    CmosRead          ;Read Temperature byte
    ;
    ; mov     ah,ah            ;Get the time/level
    ; and     ah,18h          ;Just the time and level
    ;
    ; please
    ; mov     bh,al           ;Set the direction
    ; and     al,7            ;Level computed for Temp
    ; range
    ; and     bh,11000000b    ;Direction
```

```
    cmp     ah,0             ;Good read?
    jne     LeaveDownCountT   ;No, leave it alone
```

```
    ;
    ; This is where we do some thermal management
    ; Hold ah value or reset it as needed...
    ;
```

```
    cmp     bh,11000000b     ;OSC?
    jne     NotTR_OSC        ;No!
```

Looking at direction,
prediction
Dependent on
SetTrange and storing
value in CMOS for this
read.

(B) ... predicting future changes in said
temperature

EXHIBIT I-2

EXHIBIT V-29

Implementation functional
For prototype and patent purposes
By 9/15/1994

74. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (P)



EXHIBIT V-30

Information disclosed herein is proprietary and confidential to the U.S. Navy.

74. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (P)

=====

```
| ; OSC, so set the temp level up by one |
| ; |
| mov bh,00000000b ;force downward |
| cmp al,7 ;Already at max? |
| je NotTR_OSC ;yes, leave alone |
| inc al ;force level temp up by one |
| NotTR_OSC: |
| =====
```

EXHIBIT I-3

```
| ; Time needs to be set based on T Level |
| ; |
| mov ah,7 ;Max available |
| sub ah,al ;7-7 = 0 so watch it! |
| cmp ah,0 |
| jne NotBig2 ;Not zero |
| inc ah ;look at every minute |
| NotBig2:shl ah,2 ;Align the time constant |
| or ah,bh ;Align the direction |
| or ah,al ;Align the TRange |
| mov bl,al ;TRange |
| mov bh,0 ;Upper index.
```

=====

(B) ... predicting future changes in said
temperature

=====

Predicting future changes.
By studying trend to be downward,
Upward, stable, or oscillating.

74. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (P)

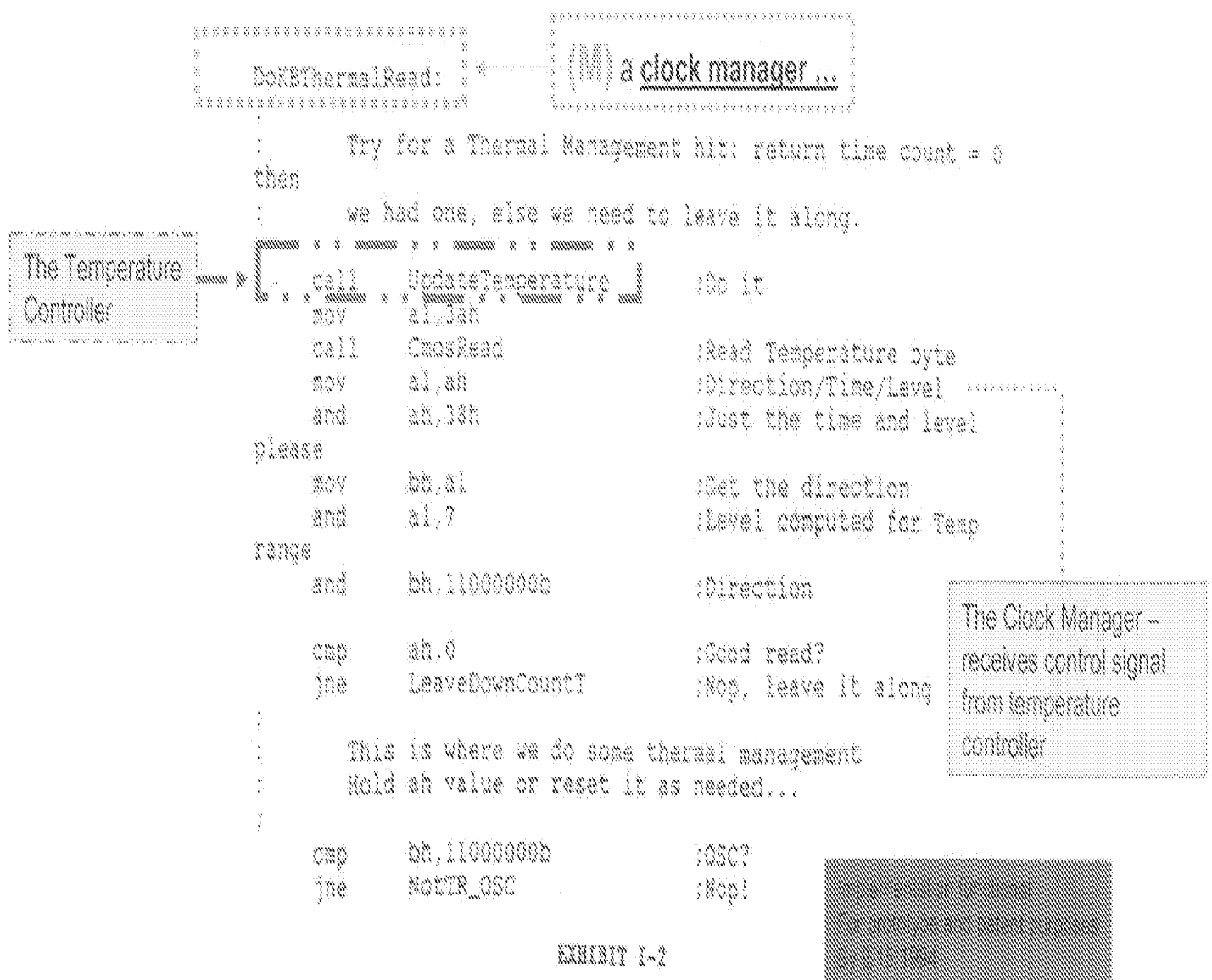


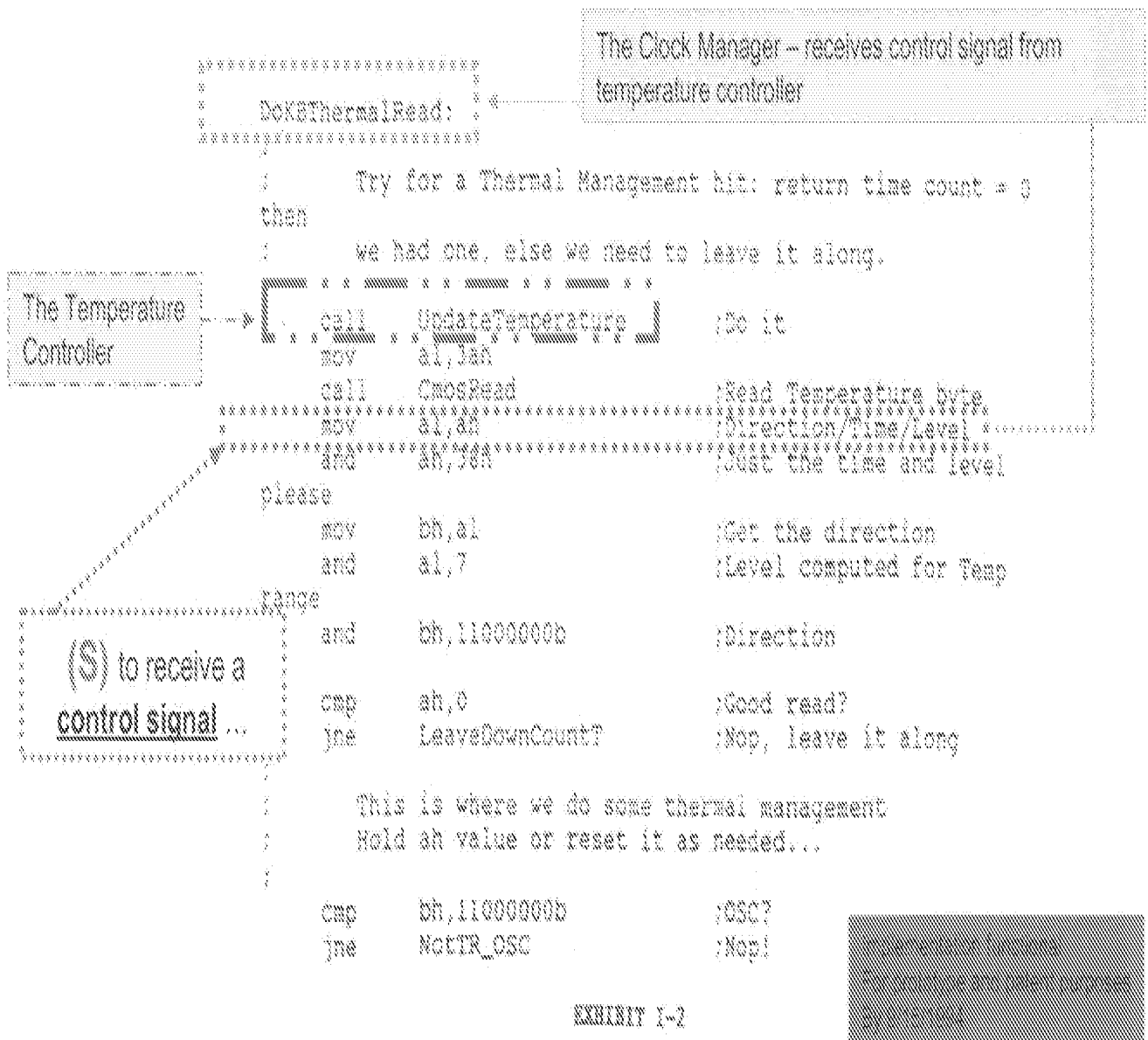
EXHIBIT I-2

EXHIBIT V-32

74. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (P)



74. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (P)

(P) ... clock manager selectively stopping clock signals ... a) said monitored temperature rises to at least a selected reference temperature ...
b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

```

DoXBThermalRead:
:
:       Try for a Thermal Management hit: return time count = 0
:
:       Then
:
:       we had one, else we need to leave it along.
:
:       call    UpdateTemperature    ;Do it
:       mov     al,3ah
:       call    CmosRead             ;Read Temperature byte
:       mov     al,ah                ;Direction/Time/Level
:       and     ah,3fh               ;Just the time and level
:
:       please
:       mov     bh,al                ;Get the direction
:       and     al,7                 ;Level computed for Temp
:
:       range
:       and     bh,11000000b         ;Direction
:
:       cmp     ah,0                 ;Good read?
:       jne     LeaveDownCountT      ;No, leave it along
:
:       This is where we do some thermal management
:       Hold ah value or reset it as needed...
:
:       cmp     bh,11000000b         ;OSC?
:       jne     NotTR_OSC            ;No!

```

Valid Temperature
found

Temperature not found
For unknown reason
Error 100

EXHIBIT I-2

EXHIBIT V-34

74. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (P)

(P) ... clock manager selectively stopping clock signals ... a) said monitored temperature rises to at least a selected reference temperature ...

b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

Modifies clock signal

```

; need to setup the Done Value based on current TRange
;
;=====
IFDEF x86llyp                ;3.08.1 6-3-95w Set Done
;=====
mov     ax,byte ptr curTRangeTable[bx]
mov     al,34h               ; Index register to write
call    CfgWrite
ENDIF ;x86llyp

IFDEF x86llyd                ;3.08.1 6-3-95w Add done
code here
ENDIF ;x86llyd

pop     ax                   ; Minutes to next scan
WriteDownCountT:
mov     al,3ah
call    CfgWrite             ; Write it put
LeaveDownCountT:
pop     ax
pop     ax
popfd
;Restore Interrupts
IRET
;=====

```

```

;=====
TRangeTable:
db      00h                 ; Disabled
db      30h                 ; 1 sec's
db      30h                 ; 1 sec
db      20h                 ; 1/2 sec
db      20h,20h,20h,20h,20h ; 4.48b 5-11-95
;      db      20h           ; 1/4 sec
;=====

```

EXHIBIT 6-3

Reference Temperature

EXHIBIT V-35

TempRange	label	byte
ECTempRange	label	byte
db	00h	Level 0
db	00h	Level 1
db	10h	Level 2
db	10h	Level 3
db	14h	Level 4
db	14h	Level 5
db	18h	Level 6
db	18h	Level 7
ACTempRange	label	byte
db	10h	Level 0
db	10h	Level 1
db	10h	Level 2
db	10h	Level 3
db	11h	Level 4
db	11h	Level 5
db	15h	Level 6
db	17h	Level 7

UpdateTemperature endp

EXHIBIT 1-9

Note: The Macro "IFDEF" was added on 6-3-95 because This code was used for another Product also called llyd. The original code that was Working by 9/15/94 is there, the Macro for llyd does not have Any code generation as of yet Here since it was not written for The new product. As faster processors were added to llyp products, the tables changed to under them also (see 4.48b 5-11-95)

74. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (P)

(P) ... clock manager selectively stopping clock signals ... a) said monitored temperature rises to at least a selected reference temperature ...

b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

EXHIBIT I-3

```

;
;      CSC, so set the temp level up by one
;
      mov     bh,00000000b      ;Force downward
      cmp     al,7              ;Already at max?
      je      NotTR_OSC        ;yep, leave alone
      inc     al                ;Force level temp up by one
NotTR_OSC:
;
;      Time needs to be set based on T Level
;
      mov     ah,7              ;Max available
      sub     ah,al             ;7-7 = 0 so watch it!
      cmp     ah,0
      jne     NotBig2          ;Not zero
      inc     ah                ;look at every minute
NotBig2:shl     ah,2            ;Align the time constant
      or      ah,bh             ;Align the direction
      or      ah,al             ;Align the TRange
      mov     bl,al             ;TRange
      mov     bh,0              ;Upper Index.

```

Tlevel sets time – based on acceptable level of temperature rise or fall

(direction gives rise or fall, and TRange give temperature Low and Max in range.

Acceptable rate is time and temperature based dependent on direction of trend.

Claim 75

75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and
a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

```

.....
(T) a temperature controller ...
.....
DoKBThermalRead:
:
:   Try for a Thermal Management hit: return time count = 0
:   then
:       we had one, else we need to leave it along.
:
:   .....
:   call    UpdateTemperature    ;Do it
:   mov     al,3ah
:   call    CmosRead              ;Read Temperature byte
:   mov     al,ah                 ;Direction/Time/Level
:   and     ah,3fh                ;Just the time and level
:   please
:   mov     bh,al                 ;Get the direction
:   and     al,7                  ;Level computed for Temp
:   range
:   and     bh,11000000b          ;Direction
:   cmp     ah,0                  ;Good read?
:   jne     LeaveDownCountT       ;Nop, leave it along
:
:   This is where we do some thermal management
:   Hold ah value or reset it as needed...
:
:   cmp     bh,11000000b
:   jne     NotTR_OSC
:
:   .....

```

DoKBThermalRead
calls
Temperature Controller:
"UpdateTemperature"

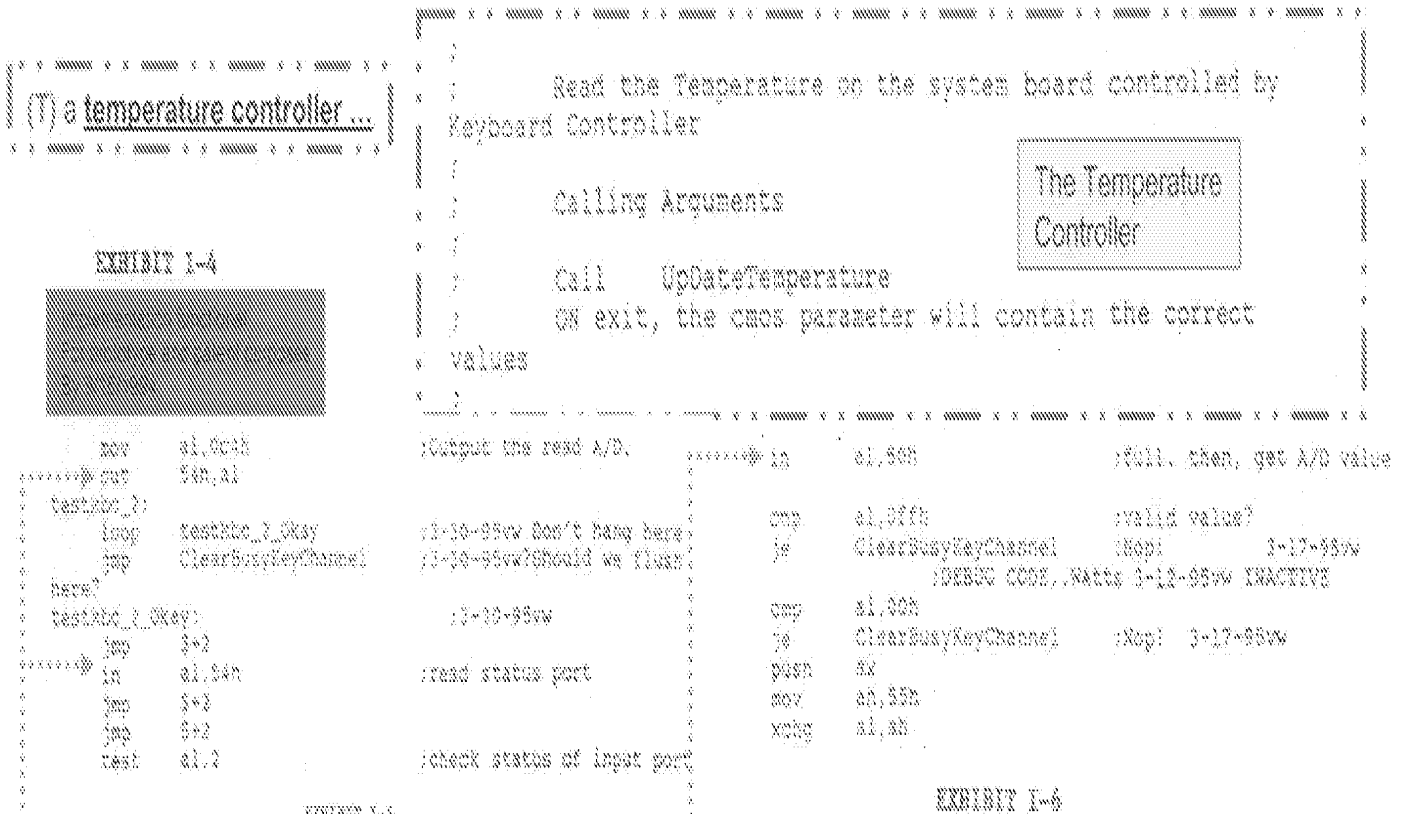
Thermal Management
For DownCountT
B. Ch. 12.4

EXHIBIT I-2

75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)



Note: Channels 64 was changed to 54 and 60 was changed to 50 after 9/15/94. Does not affect invention, just make product work better for multitasking operating systems. Same temperature was obtained either way. Channels 60 and 64 used for FCC and UL agency testing. Implementation was functional and complete for patent purpose by 9/15/94.

75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

```
cmp    al,08h           ;Time to read data from x2?
je      DoXBThermalRead
shr     al,3
dec     al
and     ah,NOT 18h       ;Keep the old stuff
shl     al,3
or      ah,al            ;New value
jnp     WriteDownCountT
```

DoXBThermalRead:

```
;
; Try for a Thermal Management hit: return time count = 0
; then
```

```
; We "MAY" have what we need to leave it along.
```

```
; call    UpdateTemperature ;do it
; mov     al,1ah
; call    CMOSRead          ;Read Temperature byte
; mov     al,0h             ;Divide by (TIME/LEVEL)
; and     ah,30h            ;Just the time and level
```

```
please
mov     bh,al              ;Get the direction
and     al,7              ;level computed for Temp
range
and     bh,11000000b       ;direction
```

```
cmp     ah,0              ;Good read?
jne     LeaveDownCountT    ;Nop, leave it along
```

```
; This is where we do some thermal management
; Hold ah value or reset it as needed...
```

```
cmp     bh,11000000b       ;OSC?
jne     NotTR_OSC          ;Nop!
```

EXHIBIT I-2

Valid sampled temperature

(E) ... using said sampled temperature at least once as a starting point

Sampled Temperature
Returned in CMOS Storage area.
Read CMOS storage to fetch sample point
(also returns "trends" found with sample point for later prediction)

Implementation functional
For prototype and patent purposes
By 9/15/1994

EXHIBIT V-39

75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and
a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

```

SetRange:
    xchg    al,cl                ;Al has temp back; ah=index
    mov     cx,7                ;cx = loop count
ScanRange:
    mov     bx,cx
    add     al,ah                ;Over index for ax or dx
    cmp     al,byte ptr cs:[TempRange+bx]
    jg      FoundRange          ;overrange number found
    loop    ScanRange
FoundRange:
    ;overrange number found

    mov     al,30h              ;Read Keyboard channel
access flag
    call    CMOSRead
    mov     al,ah
    and     al,3
    and     ah,0c0h              ;Last Temperature range
    and     ah,0c0h              ;Upper direction trend value
    cmp     cl,al                ;Value of CMOS trend
    je      RangeStable         ;Stable process, same range
    jg      RangeUpward         ;New range is greater than
old end
    ;Range is downward trend
    cmp     ah,100000000h        ;Lasttime upward?
    je      RangeOSC            ;Yes, found osc
    mov     ch,01h
    jmp     short AllRange
RangeOSC:
    mov     ch,0c0h              ;OSC flag
    jmp     short AllRange
RangeStable:
    mov     ch,00h
    jmp     short AllRange
RangeUpward:
    cmp     ah,010000000h        ;Last one Downward?
    je      RangeOSC            ;Yes, Osc found
    mov     ch,10

```

(E) using said sampled temperature at least once as a starting point

CMOS Storage Area
Returned in CMOS Storage area in register AL.

Sampled Temperature
Returned in CMOS Storage area in register AL.

Prediction Work
based on sample
as starting point

Exhibit 1-6

75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and
a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

```
    cmp     al,0ah          ;Time to read data from SP?
    je      DoKSThermalRead
    shr     al,3
    dec     al
    and     ah,NOT 3ah      ;Keep the old stuff
    shl     al,3
    or      ah,al           ;New value
    jmp     WriteDownCountT
```

DoKSThermalRead:

```
    ; Try for a Thermal Management hit: return time count = 0
    then
    ; we had one, else we need to leave it along.
```

```
    call    UpdateTemperature ;Do it
    mov     al,3ah
    call    CMOSRead          ;Read Temperature byte
    ;mov     ah,ah             ;Time/Level
    and     ah,3ah            ;Just the time and level
    ;please
    mov     bh,al             ;Get the direction
    and     al,7              ;Level computed for Temp
    ;range
    and     bh,11000000b      ;Direction
```

```
    cmp     ah,0             ;Good read?
    jne     LeaveDownCountT   ;Nop, leave it along
```

```
    ; This is where we do some thermal management
    ; Hold ah value or reset it as needed...
```

```
    cmp     bh,11000000b      ;OK?
    jne     RetTR_OSC         ;Nop!
```

EXHIBIT I-2

Looking at direction,
prediction
Dependent on
SetTrange and storing
value in CMOS for this
read.

(B) ... predicting future changes in said
temperature

Implementation functional
For prototype and patent purposes
8/15/1994

EXHIBIT V-41

75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and
a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)



75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and
a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

EXHIBIT I-3

```

=====
|      OSC, so set the temp level up by one      |
|-----|
|      mov    bh,00000000b                       |;Force downward|
|      cmp    al,7                               |;Already at max?|
|      je     NotTR_OSC                          |;yes, leave alone|
|      inc    al                                 |;force level temp up by one|
|NotTR_OSC:                                     |
|-----|
|      Time needs to be set based on T Level    |
|-----|
|      mov    ah,7                               |;Max available|
|      sub    ah,al                             |;7-7 = 0 so watch it!|
|      cmp    ah,0                               |
|      jne    NotBigZ                            |;Not zero|
|      inc    ah                                 |;Look at every minute|
|NotBigZ:shl    ah,1                             |;Align the time constant|
|      or     ah,bh                             |;Align the direction|
|      or     ah,al                             |;Align the TRange|
|      mov    bl,al                             |;TRange|
|      mov    bh,0                             |;Upper Index.|
|
|-----|

```

(B) ... predicting future changes in said
temperature

Predicting future changes.
By studying trend to be downward,
Upward, stable, or oscillating.

EXHIBIT V-43

Implementation functional
For prototype and patent purposes
By 9/15/2004

75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

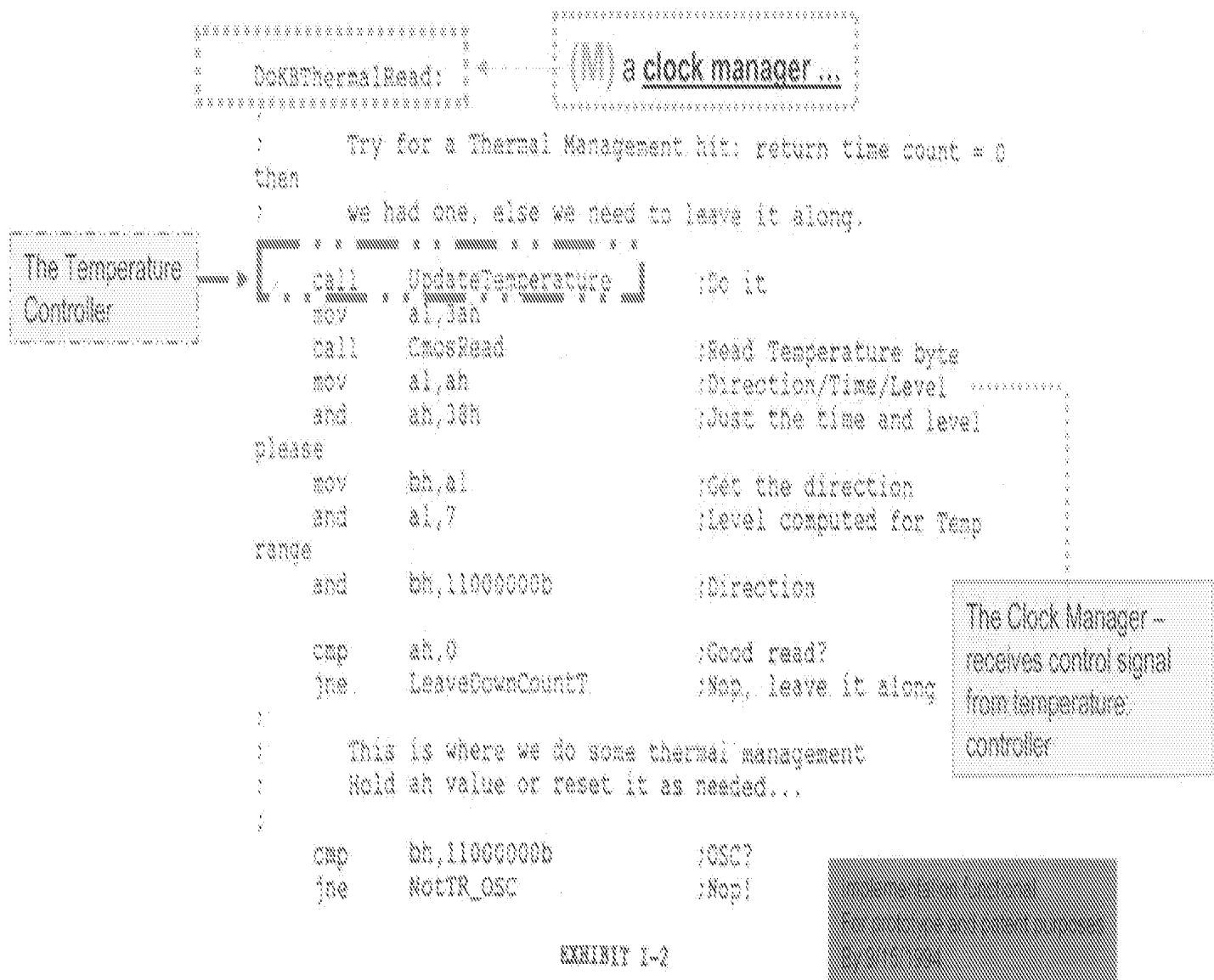


EXHIBIT I-2

EXHIBIT V-44

75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

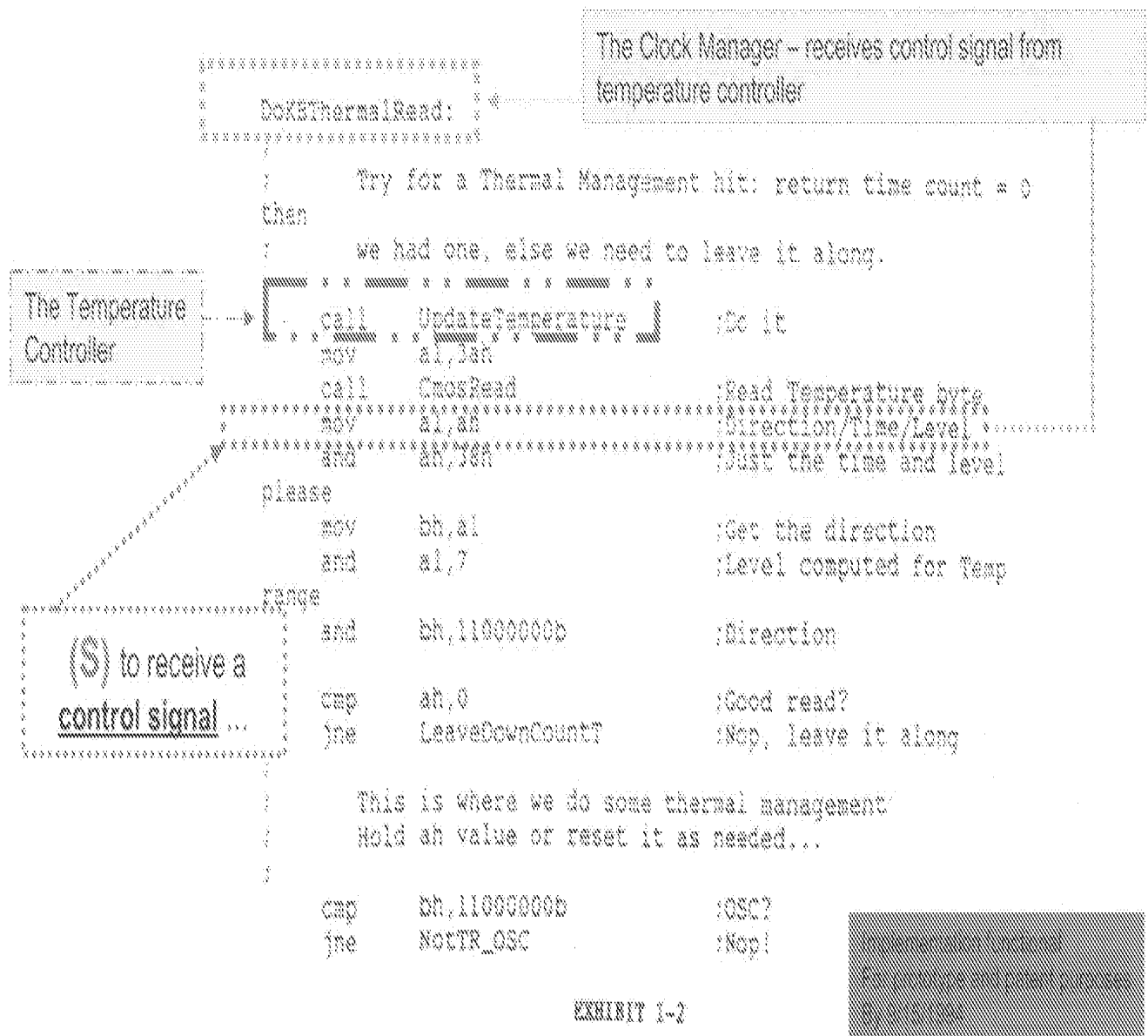


EXHIBIT 1-2

EXHIBIT V-45

75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

(R) ... clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

OoKBThermalRead:

```
:
:      Try for a Thermal Management hit: return time count = 0
then
:      we had one, else we need to leave it along.
```

```
:      call    UpdateTemperature    ;Do it
:      mov     al,3ah
:      call    CmosRead             ;Read Temperature byte
:      mov     al,ah                ;Direction/Time/Level
:      and     ah,38h              ;Just the time and level
```

```
please
:      mov     bh,al               ;Get the direction
:      and     al,7                ;Level computed for Temp
```

```
range
:      and     bh,11000000b        ;Direction
```

```
:      cmp     ah,0               ;Good read?
:      jne     LeaveDownCountT    ;Nop, leave it alone
```

```
:      This is where we do some thermal management
:      Hold ah value or reset it as needed...
```

```
:      cmp     bh,11000000b       ;OSC?
:      jne     NotTR_OSC          ;Nop!
```

Leaves clock speed
the same
"A 1st clock Signal"

Valid Temperature
found, a 2nd Clock
Signal if changed

EXHIBIT I-2

EXHIBIT V-46

Generated by
FBI Laboratory
6/15/2004

75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

(R) ... clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

Modifies clock signal

Need to setup the Dore Value based on current change

```
IFDEF xallilyp ;5.08.1 6-3-95w Set Dore
;
mov ax,byte per cr:TDoreTable[bx]
mov al,5Ah ; Index register to write
call CfgWrite
ENDIF ;xallilyp
```

```
IFDEF xallilyp ;5.08.1 6-3-95w Add done
Code here
ENDIF ;xallilyp
```

```
pop ax ; Minutes to next scan
WriteDownCountT:
mov al,5Ah
call CfgWrite ; Write it out
LeaveDownCountT:
pop bx
pop ax
popl ; Restore interrupts
ret
```

```
TDoreTable:
db 00h ; Disabled
db 30h ; 1 sec's
db 30h ; 1 sec
db 30h ; 1/2 sec
db 20h,20h,20h,20h,20h ; 4.485 5-11-95
; db 20h ; 1/4 sec
```

EXHIBIT V-3

Reference Temperature

TempChange	Label	Byte
DiffTempChange	Label	Byte
db	00h	(Level 0)
db	00h	(Level 1)
db	10h	(Level 2)
db	10h	(Level 3)
db	10h	(Level 4)
db	10h	(Level 5)
db	10h	(Level 6)
db	10h	(Level 7)
ACTTempChange	Label	Byte
db	10h	(Level 0)
db	10h	(Level 1)
db	10h	(Level 2)
db	10h	(Level 3)
db	20h	(Level 4)
db	20h	(Level 5)
db	20h	(Level 6)
db	20h	(Level 7)

UpdateTemperature ends

EXHIBIT V-4

Note: The Macro "IFDEF" was added on 6-3-95 because This code was used for another Product also called lilyp. The original code that was Working by 9/15/94 is there, the Macro for lilyp does not have Any code generation as of yet Here since it was not written for The new product. As faster processors were added to lilyp products, the tables changed to under them also (see 4.485 5-11-95)

EXHIBIT V-47

75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

(R) ... clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

EXHIBIT I-3

```

;
;      OSC, so set the temp level up by one
;
      mov     bh,00000000b      ;Force downward
      cmp     al,7              ;Already at max?
      je      NotTR_OSC        ;yep, leave alone
      inc     al                ;Force level temp up by one
NotTR_OSC:
;
;      Time needs to be set based on T Level
;
      mov     ah,7              ;Max available
      sub     ah,al             ;7-7 = 0 so watch it!
      cmp     ah,0
      jne     NotBigZ          ;Not zero
      inc     ah                ;Look at every minute
NotBigZ: shl     ah,2            ;Align the time constant
      or      ah,bh             ;Align the direction
      or      ah,al             ;Align the TRange
      mov     dl,al             ;TRange
      mov     bh,0              ;Upper index.

```

Tlevel sets time – based on acceptable level of temperature rise or fall
(direction gives rise or fall, and TRange give temperature Low and Max in range.
Acceptable rate is time and temperature based dependent on direction of trend.

75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

(R) ... clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

```

:      OSC, so set the temp level up by one
:
      mov     bh,00000000b      ;force downward
      cmp     al,7              ;Already at max?
      je      NotTR_OSC        ;yep, leave alone
      inc     al                ;force level temp up by one
NotTR_OSC:
:
:      Time needs to be set based on T Level
:
      mov     ah,7              ;Max available
      sub     ah,al             ;7-7 = 0 so watch it!
      cmp     ah,0
      jne     NotBigZ          ;Not zero
      inc     ah                ;Look at every minute
NotBigZ:shl     ah,3             ;Align the time constant
      or      ah,bh             ;Align the direction
      or      ah,al             ;Align the TRange
      mov     bl,al             ;TRange
      mov     bh,0              ;Upper index.
:
:      Need to setup the Doze Value based on current TRange
:
      push    ax

```

```

IFDEF  azzililyp              ;5.08.1 6-3-98vw Set Doze
value

```

```

      mov     ah,byte ptr cs:TDozeTable[bx] ;*****
      mov     al,34h            ; Index register to write *****
      call    Cfgwrite

```

Rising faster than
Acceptable rate,
forces second
clock signal

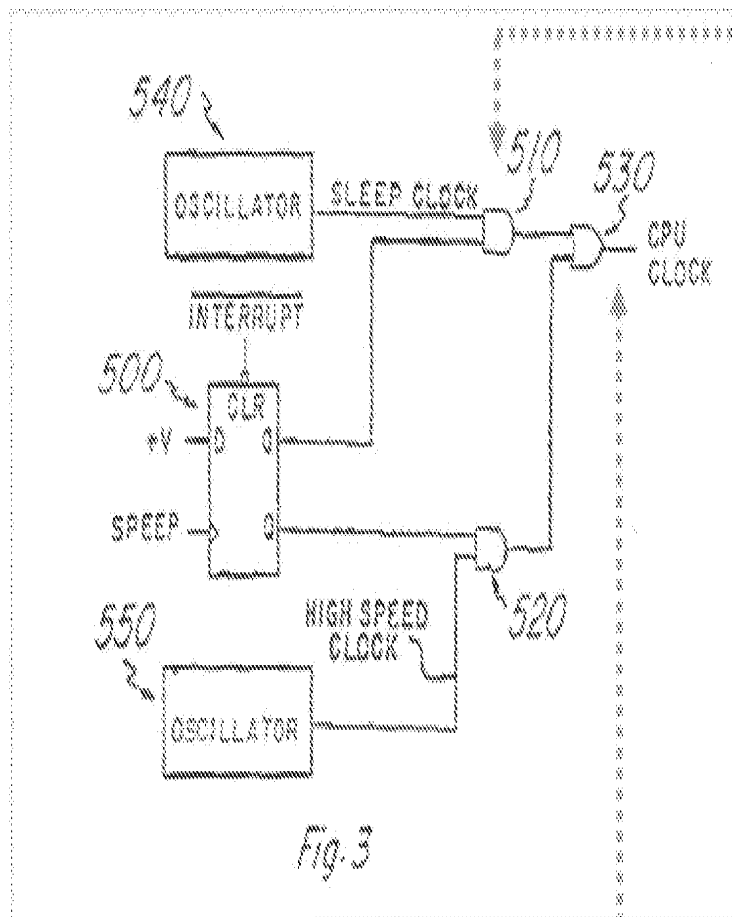
Computes Clock
Signal

Receive a First or
Second clock
signal

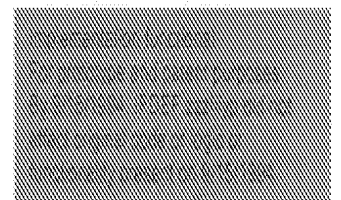
75. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and a clock manager (M) adapted to receive a control signal (S) from said temperature controller, said clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)

(R) ... clock manager designating that a processing unit receives a first clock signal unless one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate, pursuant to which said clock manager designating that said processing unit receives a second clock signal. (R)



Rising faster than
Acceptable rate,
forces second
clock signal



Computes Clock
Signal

Receive a First or
Second clock
signal

Claim 76

76. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and
a clock manager (M) adapted to receive a control signal (Q) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (S)

```

.....
(T) a temperature controller ...
.....
DoKBThermalRead:
;
; Try for a Thermal Management hit: return time count = 0
; then
; we had one, else we need to leave it along.
;
.....
call UpdateTemperature ; Do it
mov     al,3ah
call    CmosRead        ;Read Temperature byte
mov     al,ah            ;Direction/Time/Level
and     ah,38h           ;Just the time and level
;
; please
mov     bh,al            ;Get the direction
and     al,7             ;Level computed for Temp
; range
and     bh,11000000b     ;Direction
;
cmp     ah,0             ;Good read?
jne     LeaveDownCountT  ;Nop, leave it along
;
; This is where we do some thermal management
; Hold ah value or reset it as needed...
;
;
cmp     bh,11000000b
jne     NotIR_OSC

```

Thermal Management
For processing speed control
B. 1.1.1.1.1.1

EXHIBIT I-2

EXHIBIT V-51

76. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (Q) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (S)

(T) a temperature controller ...

EXHIBIT I-4



```

mov     al,00ch
out     $4b,al
testbnc_2:
loop    testbnc_2_Okay
jnp     ClearBusyKeyChannel
here?
testbnc_3_Okay:
jmp     $+1
in      al,$4h
jmp     $+1
jnp     $+2
test    al,2

```

/Output the read A/D.

/read status port

/check status of input port

```

:
:      Read the Temperature on the system board controlled by
:      Keyboard Controller
:
:      Calling Arguments
:
:      Call    UpDateTemperature
:      ON exit, the cmos parameter will contain the correct
:      values
:

```

The Temperature
Controller

```

in      al,80h
cmp     al,0ffh
jns     ClearBusyKeyChannel
;DEBUG CODE. Waits 3-12-95vw INACTIVE
cmp     al,00h
jns     ClearBusyKeyChannel
push    ax
mov     ah,33h
xchg    al,ah

```

/full. Then, get A/D value

/valid value?

/Nop! 3-17-95vw

/Nop! 3-17-95vw

EXHIBIT I-5

Reads Temperature for
starting point

EXHIBIT I-6

Register al contains temperature

Note: Channels 64 was changed to 54 and 60 was changed to 50 after 9/15/94. Does not affect invention, just make product work better for multitasking operating systems. Same temperature was obtained either way. Channels 60 and 64 used for FCC and UL agency testing. Implementation was functional and complete for patent purpose by 9/15/94.

76. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (Q) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (S)

```

cmp     al,00h                ;Time to read data from AS?
je      DoXBThermalRead
shr     al,1
dec     al
and     ah,NOT 10h            ;Keep the old stuff
shl     al,1
or      ah,al                 ;New value
jap     WriteDownCountF

```

DoXBThermalRead:

```

;
; Try for a Thermal Management hit; return time count = 0
;
then

```

;; Huh huh, time we need to leave it alone.

```

call    UpdateTemperature     ;Do it
mov     al,10h
call    CMOSRead              ;Read Temperature byte
mov     al,ah
and     ah,10h                ;Just the time and level

```

```

please
mov     bh,al                  ;Get the direction
and     al,7                   ;Level computed for Temp

```

```

range
and     bh,1100000000h        ;Direction

```

```

cmp     ah,0                   ;Good read?
jne     LeaveDownCountF       ;Nop, leave it alone

```

```

; This is where we do some thermal management
; Hold ah value or reset it as needed...
;

```

```

cmp     bh,1100000000h        ;OSC?
jne     NotTR_OSC             ;Nop!

```

EXHIBIT I-2

Valid sampled temperature

(E) ... using said sampled temperature at least once as a starting point

Sampled Temperature
Returned in CMOS Storage area.
Read CMOS storage to fetch sample point
(also returns "trends" found with sample point for later prediction)

Implementation functional
For prototype and patent purposes
By 9/15/1994

76. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (Q) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (S)

```

SetRange:
    xchg    al,cl                ;Al has temp back; str=index
    mov     cx,7                ;cx = loop count
ScanRange:
    mov     bx,cx
    add     si,ah                ;Over index for ac or dc
    cmp     al,byte ptr cs:[TempRange-bx]
    jg      FoundRange          ;cx=range number found
    loop    ScanRange
FoundRange:
    ;cx=range number found

    mov     si,17h              ;Read Keyboard Channel
    cld
    scasd
    mov     al,ah
    and     si,1                ;last Temperature range
    and     ah,0c0h              ;Upper direction trend value
    cmp     cl,al                ;Value of cmos read
    js      RangeStable         ;Stable process, same range
    jg      RangeUpward         ;New range is greater than
old one
;
;      ;Range is downward trend
    cmp     ah,100000000h        ;Last one upward?
    js      RangeOSC            ;Yes, found asc
    mov     ch,01h
    jmp     short AllRange
RangeOSC:
    mov     ch,0c0h              ;OSC flag
    jmp     short AllRange
RangeStable:
    mov     ch,00h
    jmp     short AllRange
RangeUpward:
    cmp     ah,010000000h        ;Last one Downward?
    js      RangeOSC            ;Yes, Dec found
    mov     ch,10

```

(E) using said sampled temperature at least once as a starting point

Implementations of the present invention may include computer programs, which may be embodied in a computer-readable medium.

Sampled Temperature
Returned in CMOS Storage area in register AL.

Prediction Work
based on sample
as starting point

Exhibit 1-6

76. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (Q) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (S)

```

cmp     al,08h           ;Time to read data from KS?
je      DoKSThermalRead
shr     al,1
dec     al
and     ah,NOT 38h       ;Keep theold stuff
shl     al,2
or      ah,al            ;New value
jmp     WriteDownCountT

```

DoKSThermalRead:

```

;
; Try for a Thermal Management hit: return time count = 0
; then
; we had one, else we need to leave it along.
;

```

```

call    UpdateTemperature ;Do it
mov     al,38h
call    CmosRead          ;Read Temperature byte
;-----
mov     al,ah              ;Direction/Time/Level
and     ah,3fh             ;Just the time and level
;
; please
;
mov     bh,al              ;Get the direction
and     al,7               ;level computed for Teap
; range
and     bh,11000000b       ;Direction
;-----

```

```

cmp     ah,0              ;Good read?
jne     LeaveDownCountT    ;Nop, leave it along

```

```

; This is where we do some thermal management
; Hold ah value or reset it as needed...
;

```

```

cmp     bh,11000000b       ;OSC?
jne     NotTB_OSC          ;Nop!

```

Looking at direction,
prediction
Dependent on
SetTrange and storing
value in CMOS for this
read.

(B) ... predicting future changes in said
temperature

EXHIBIT I-2

EXHIBIT V-55

Implementation functional
For prototype and patent purposes
By 9-15-1994

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (Q) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (S)

Prediction based on trends

EXHIBIT Y-56

76. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and
a clock manager (M) adapted to receive a control signal (Q) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (S)

```

|-----|
| ;      OSC, so set the temp level up by one      |
| ;|
| mov     bh,00000000b      ;Force downward      |
| cmp     al,7              ;Already at max?      |
| je      NotTR_OSC         ;yep, leave alone      |
| inc     al                ;force level temp up by one |
| NotTR_OSC:|
|-----|

```

EXHIBIT I-3

```

| ;      Time needs to be set Based on T Level      |
| ;|
| mov     ah,7              ;Max available      |
| sub     ah,al             ;7-7 = 0 so watch it!  |
| cmp     ah,0              |
| jne     NotSig2           ;Not zero            |
| inc     ah                ;Look at every minute  |
| NotSig2:shl     ah,1      ;Align the time constant |
| or      ah,bh            ;Align the direction    |
| or      ah,al            ;Align the TRange      |
| mov     bl,al             ;TRange              |
| mov     bh,0             ;Upper index.          |
|
|

```

(B) ... predicting future changes in said temperature

Predicting future changes
By studying trend to be downward,
Upward, stable, or oscillating.

EXHIBIT V-57

Implementation functional
For prototype and patent purposes
By 9/15/2004

76. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and
a clock manager (M) adapted to receive a control signal (Q) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (S)

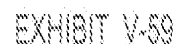


EXHIBIT I-2

EXHIBIT V-58

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and

a clock manager (M) adapted to receive a control signal (Q) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (S)



76. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and a clock manager (M) adapted to receive a control signal (C) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.
(S)

(S) ... clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

DoXBThermalRead:

:
: Try for a Thermal Management hit: return time count = 0
then
: we had one, else we need to leave it along.

: call UpdateTemperature ;Go it
: mov al,3ah
: call CmosRead ;Read Temperature byte
: mov al,ah ;Direction/Time/Level
: and ah,38h ;Just the time and level
please
: mov bh,al ;Get the direction
: and al,7 ;Level computed for Temp
range
: and bh,11000000b ;Direction

: cmp ah,0 ;Good read?
: jne LeaveDownCount? ;Nop, leave it alone

: This is where we do some thermal management
: Hold ah value or reset it as needed...

: cmp bh,11000000b ;GSC?
: jne NotTR_GSC ;Nop!

Leaves clock speed
the same
"A 1st clock Signal"

EXHIBIT V-60
For public use only
EXHIBIT V-60

EXHIBIT I-2

EXHIBIT V-60

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and a clock manager (M) adapted to receive a control signal (C) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

(5)

.....

Need to setup the Base Price based on current Range

```

INDEF :excluded                                     (0.00.1 5-1)View Add case
code here
ENDDEF :excluded

```

```

%-----
%      variable:
%      do 1000                                : 1.0000000
%      do 1000                                : 1.0000000
%      do 1000                                : 1.0000000
%      do 1000                                : 1.0000000
%      do 1000,1000,1000,1000,1000          : 0.4000000  5-11-93
%      do 1000                                : 1.0000000
%-----

```

Reference Temperature

Temperature	Label	Type
Temperature	Label	Type
40	40	Class 0
40	40	Class 1
40	40	Class 2
40	40	Class 3
40	40	Class 4
40	40	Class 5
40	40	Class 6
40	40	Class 7

id	label	type
00	000	(Level) 0
00	000	(Level) 1
00	100	(Level) 2
00	110	(Level) 3
00	110	(Level) 4
00	110	(Level) 5
00	200	(Level) 6
00	200	(Level) 7

6044 • J. Neurosci., November 11, 2009 • 29(45):6039–6046

Note: The Macro "FDEF" was added on 6-3-95 because This code was used for another Product also called lilyd. The original code that was Working by 9/15/94 is there, the Macro for lilyd does not have Any code generation as of yet Here since it was not written for The new product. As faster processors were added to lilyyp products, the tables changed to under them also (see 4.48b 5-11-95)

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (E) and a clock manager (M) adapted to receive a control signal (Q) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

(S) ... clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

```

; OSC, so set the temp level up by one
;
mov     bh,00000000b           ;Force downward
cmp     al,7                   ;Already at max?
je      NotTR_OSC              ;yes, leave alone
inc     al                     ;Force level temp up by one
NotTR_OSC:

```

International Journal of
Psychophysiology 2007, 106:105-112
© 2007 Elsevier B.V.

```

mov     ah,7                ;Max available
sub     ah,al               ;7-7 = 0 so watch it!
cmp     ah,0
jne     NotBig2             ;Not zero
inc     ah                 ;look at every minute
NotBig2:shl     ah,3         ;Align the time constant
or      ah,ah              ;Align the direction
or      ah,al              ;Align the TRange
mov     bl,al               ;TRange
mov     bh,0               ;Upper index.

```

Tlevel sets time – based on acceptable level of temperature rise or fall (direction gives rise or fall, and TRange give temperature Low and Max in range. Acceptable rate is time and temperature based dependent on direction of trend.

76. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and a clock manager (M) adapted to receive a control signal (Q) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

(S)

(S) ... clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

```

;
;      OSC, so set the temp level up by one
;
      mov     bh,00000000bh      ;force downward
      cmp     al,7                ;Already at max?
      je      NotTR_OSC          ;yes, leave alone
      inc     al                  ;force level temp up by one
NotTR_OSC:
;
;      Time needs to be set based on T Level
;
      mov     ah,7                ;Max available
      sub     ah,al                ;7-7 = 0 so watch it!
      cmp     ah,0
      jne     NotBig2             ;Not zero
      inc     ah                  ;Look at every minute
NotBig2:shl     ah,2                ;Align the time constant
      or      ah,bh                ;Align the direction
      or      ah,al                ;Align the TRange
      mov     bl,al                ;TRange
      mov     bh,0                ;Upper index.
;
;      Need to setup the Doze Value based on current TRange
;
      push    ax
;-----
IFDEF  _x86_
      value  00000000h            ;5.08.1 6-3-95vw Set Doze
;-----
      mov     ah,byte ptr cs:TDozeTable[bx]
      mov     al,54h                ; Index register to write
      call    CfgWrite

```

Rising faster than
Acceptable rate,
forces second
clock signal

Computes Clock
Signal

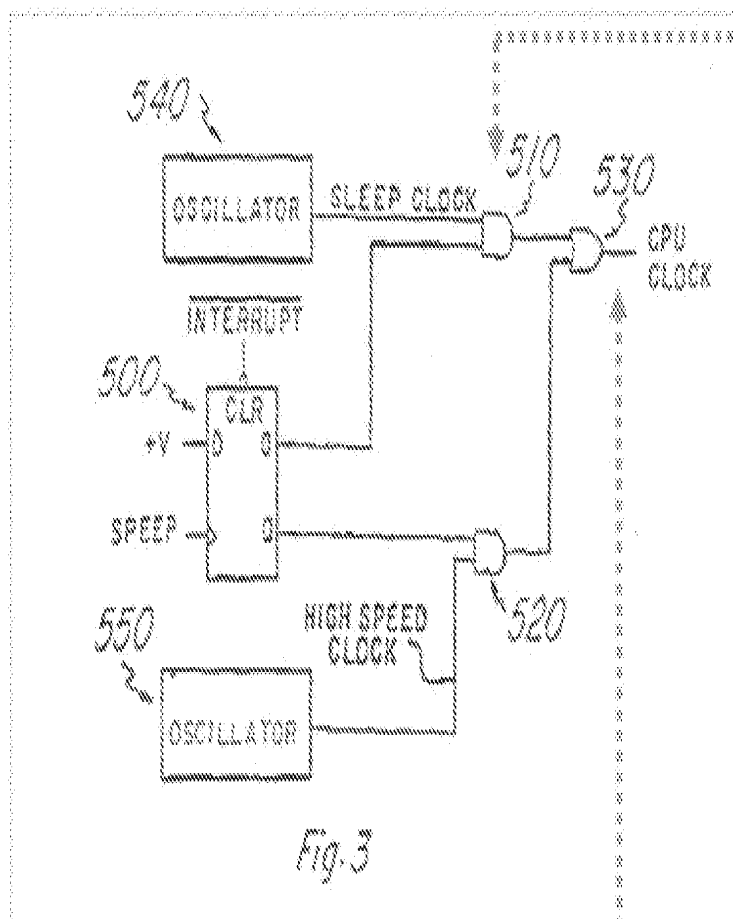
Receive a First or
Second clock
signal

76. (Previously presented) An apparatus, comprising:

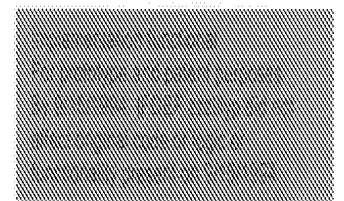
a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, (E) predicting future changes in said monitored temperature; (B) and a clock manager (M) adapted to receive a control signal (C) from said temperature controller, said clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

(S)

(S) ... clock manager reducing processing unit clock speed when one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.



Rising faster than
Acceptable rate,
forces second
clock signal



Computes Clock
Signal

Receive a First or
Second clock
signal

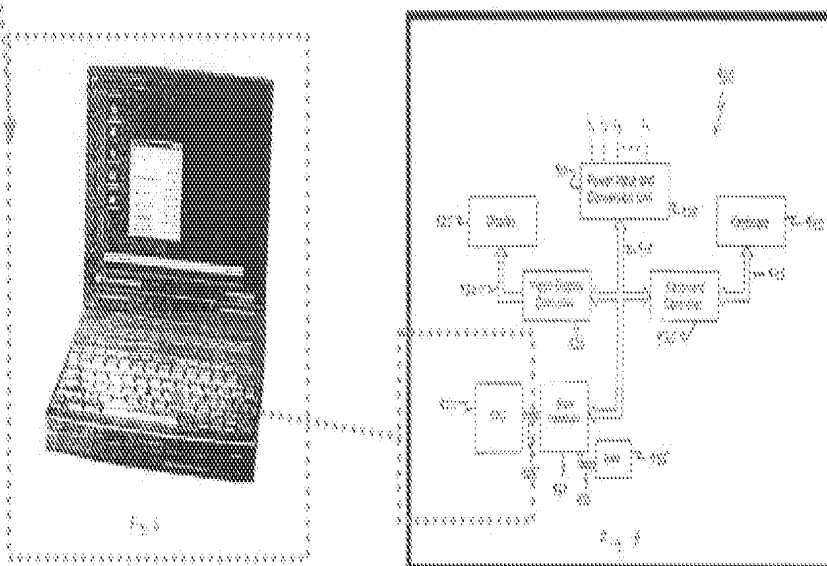
Claims 77, 78, 79

77. (Previously presented) The apparatus of Claim 74, wherein said processing unit is a central processing unit (CPU).(C)
78. (Previously presented) The apparatus of Claim 75, wherein said processing unit is a central processing unit (CPU).(C)
79. (Previously presented) The apparatus of Claim 76, wherein said processing unit is a central processing unit (CPU).(C)

(C) ... said processing unit is a central processing unit (CPU).

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

- An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.



80, 81, and 82

80. (Previously presented) The apparatus of Claim 74, further comprising:
a provision for user input coupled to said processing unit, (D) and
a provision for user output coupled to said processing unit. (E)

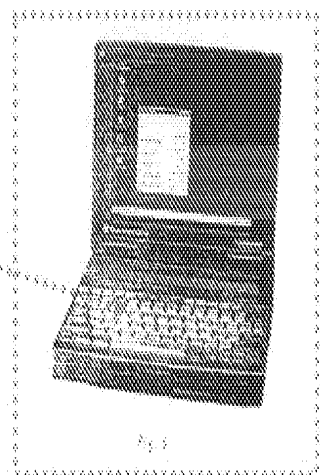
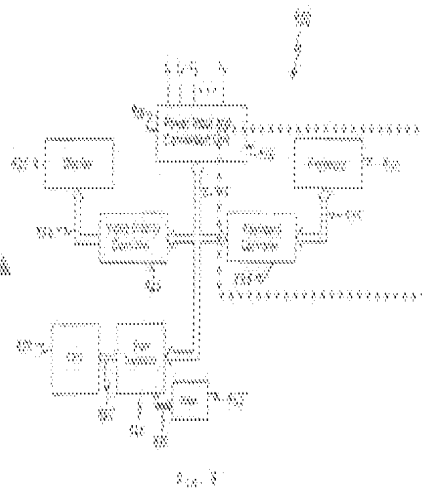
81. (Previously presented) The apparatus of Claim 75, further comprising:
a provision for user input coupled to said processing unit, (D) and
a provision for user output coupled to said processing unit. (E)

82. (Previously presented) The apparatus of Claim 76, further comprising:
a provision for user input coupled to said processing unit, (D) and
a provision for user output coupled to said processing unit. (E)

(D) ... a provision for user input coupled to said processing unit

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

- An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.
- An internal keyboard and / or and External keyboard via the PS/2 keyboard port, see figure 8 number 940.
- An internal LCD Display and and/or External Monitor via the VGA Port, see figure 8 number 925.



80. (Previously presented) The apparatus of Claim 74, further comprising:
a provision for user input coupled to said processing unit, (D) and
a provision for user output coupled to said processing unit. (E)

81. (Previously presented) The apparatus of Claim 75, further comprising:
a provision for user input coupled to said processing unit, (D) and
a provision for user output coupled to said processing unit. (E)

82. (Previously presented) The apparatus of Claim 76, further comprising:
a provision for user input coupled to said processing unit, (D) and
a provision for user output coupled to said processing unit. (E)

(E) ... a provision for user input coupled to said processing unit

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

- An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.
- An internal keyboard and / or and External keyboard via the PS/2 keyboard port, see figure 8 number 940.
- An internal LCD Display and and/or External Monitor via the VGA Port, see figure 8 number 925.

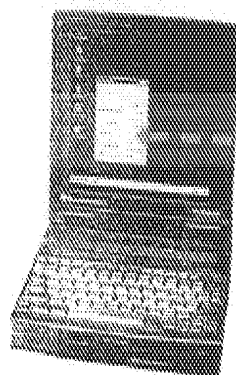


Fig. 6

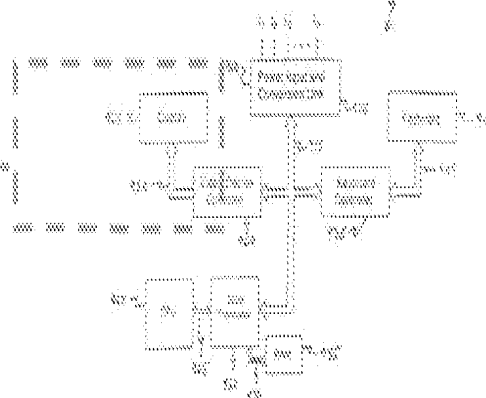


Fig. 8

Claims 83, 84, 85

83. (Previously presented) The apparatus of Claim 74, wherein said clock manager further stops clock signals from being sent to a bus coupled to the processing unit. (B)
84. (Previously presented) The apparatus of Claim 75, wherein said clock manager further stops clock signals from being sent to a bus coupled to the processing unit. (B)
85. (Previously presented) The apparatus of Claim 76, wherein said clock manager further stops clock signals from being sent to a bus coupled to the processing unit. (B)

(B) ... said clock manager further stops clock signals from being sent to a bus coupled to the processing unit.

[illegible]

Wang et al.

Set Value on PCI Bus that is
Coupled to CPU Bus

[illegible]

11-20367 Page 40

STOP CLOCK on ALL BUS(S)
Coupled to CPU Bus and CPU

83. (Previously presented) The apparatus of Claim 74, wherein said clock manager further stops clock signals from being sent to a bus coupled to the processing unit. (B)

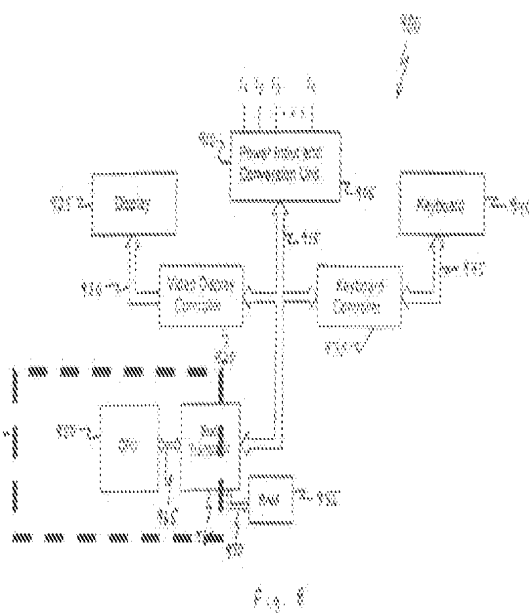
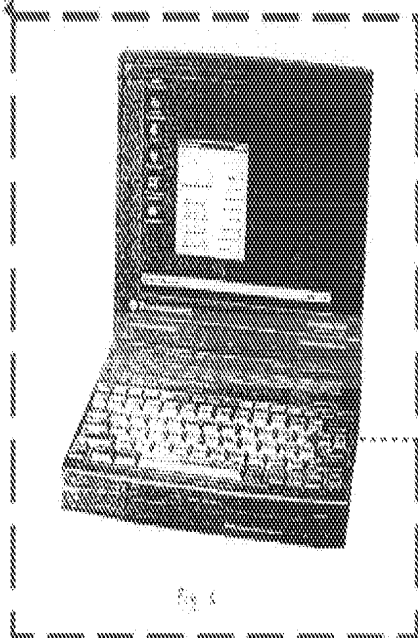
84. (Previously presented) The apparatus of Claim 75, wherein said clock manager further stops clock signals from being sent to a bus coupled to the processing unit. (B)

85. (Previously presented) The apparatus of Claim 76, wherein said clock manager further stops clock signals from being sent to a bus coupled to the processing unit. (B)

(B) ... said clock manager further stops clock signals from being sent to a bus coupled to the processing unit.

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

• An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.



83. (Previously presented) The apparatus of Claim 74, wherein said clock manager further stops clock signals from being sent to a bus coupled to the processing unit. (B)
84. (Previously presented) The apparatus of Claim 75, wherein said clock manager further stops clock signals from being sent to a bus coupled to the processing unit. (B)
85. (Previously presented) The apparatus of Claim 76, wherein said clock manager further stops clock signals from being sent to a bus coupled to the processing unit. (B)

(B) ... said clock manager further stops clock signals from being sent to a bus coupled to the processing unit.

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

- An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.
- An PCI Bus coupled to processor unit, see page 26

The 30 Mhz bus of the CPU is connected to a VL to PCI bridge chip from ACC microelectronics to generate the PCI bus. The bridge chip takes a 33.333 Mhz oscillator to make the PCI bus clock. The Cirrus Logic GD7542 video controller is driven from this bus and this bus has an external connector for future docking options.

The GD542 video controller has a 14.318 Mhz oscillator input which it uses internally to synthesize the higher video frequencies necessary to drive an internal 10.4" TFT panel or external CRT monitors. When running in VGA resolution modes the TFT panel may be operated at the same time as the external analog monitor. For Super VGA resolutions only the external CRT may be used.

- (B) ... said clock manager further stops clock signals from being sent to a bus coupled to the processing unit.

- * An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.
- * An PCI Bus coupled to processor unit, see page 26
- * An PCI Bus coupled to processor unit, is initialized via code page 43.

EXHIBIT V-71

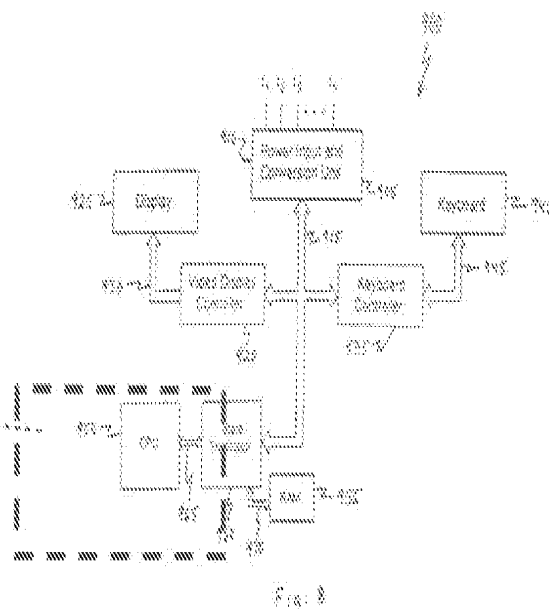
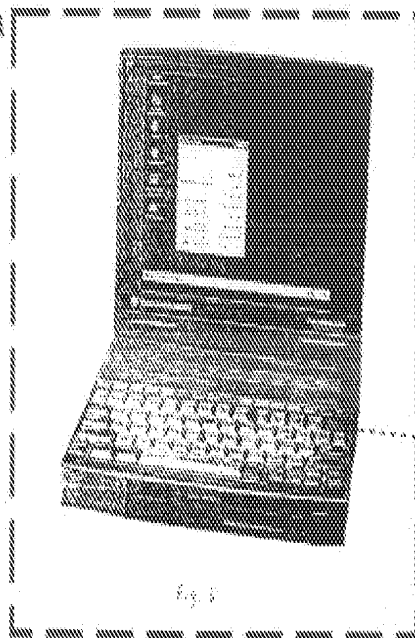
Claims 86, 87, 88

86. (Previously presented) The apparatus of Claim 83, wherein said clock manager further stops clock signals from being sent to any other processors connected to the bus. (B)
87. (Previously presented) The apparatus of Claim 84, wherein said clock manager further stops clock signals from being sent to any other processors connected to the bus. (B)
88. (Previously presented) The apparatus of Claim 85, wherein said clock manager further stops clock signals from being sent to any other processors connected to the bus. (B)

(B) ... said clock manager further stops clock signals from being sent to any other
processors connected to the bus

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

- An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.



86. (Previously presented) The apparatus of Claim 83, wherein said clock manager further stops clock signals from being sent to any other processors connected to the bus. (B)
87. (Previously presented) The apparatus of Claim 84, wherein said clock manager further stops clock signals from being sent to any other processors connected to the bus. (B)
88. (Previously presented) The apparatus of Claim 85, wherein said clock manager further stops clock signals from being sent to any other processors connected to the bus. (B)

(B) ... said clock manager further stops clock signals from being sent to any other processors connected to the bus

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

• An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.

• Multiple processors were present within the prototype as represented by Figure 7.

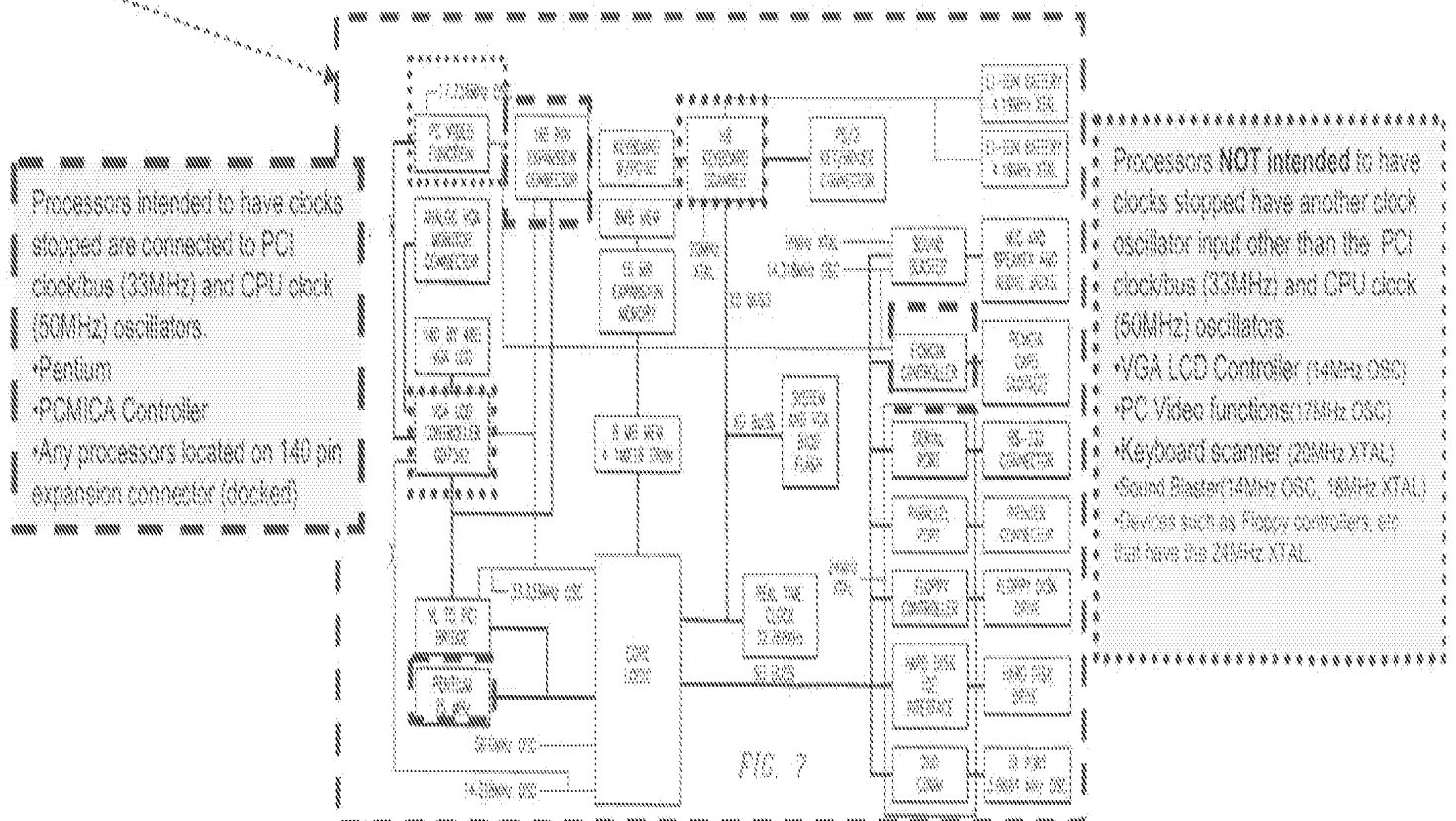


EXHIBIT V-73

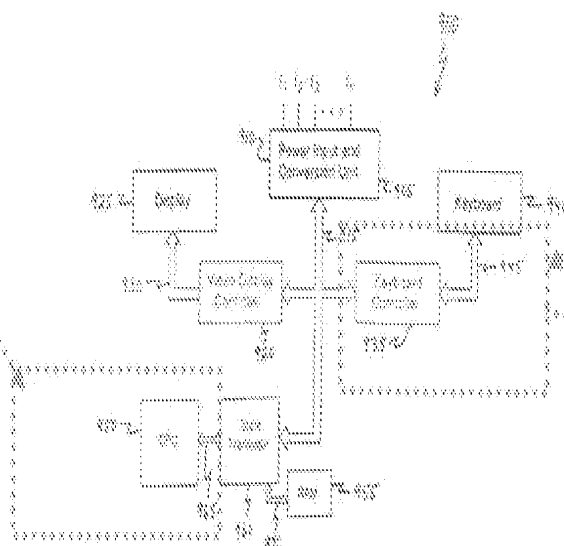
Claims 89, 90, 91

89. (Previously presented) The apparatus of Claim 74, wherein said temperature controller is on board said processing unit. (D)
90. (Previously presented) The apparatus of Claim 75, wherein said temperature controller is on board said processing unit. (D)
91. (Previously presented) The apparatus of Claim 76, wherein said temperature controller is on board said processing unit. (D)
92. (Previously presented) The apparatus of Claim 74, wherein said monitored temperature is detected via a temperature sensor coupled to said processing unit.

(D) ... said temperature controller is on board said processing unit

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

- An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.
- An internal Keyboard Controller that contained the logic and A/D converter and transmit the information to the CPU to control the temperature, see figure 8 number 940.



F-4-9

EXHIBIT V-75

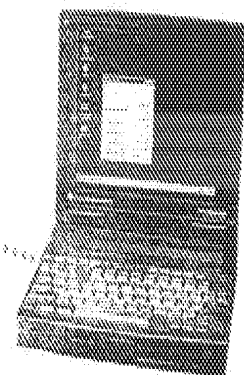


Fig. 5

89. (Previously presented) The apparatus of Claim 74, wherein said temperature controller is on board said processing unit. (D)

90. (Previously presented) The apparatus of Claim 75, wherein said temperature controller is on board said processing unit. (D)

91. (Previously presented) The apparatus of Claim 76, wherein said temperature controller is on board said processing unit. (D)

92. (Previously presented) The apparatus of Claim 74, wherein said monitored temperature is detected via a temperature sensor coupled to said processing unit.

(D) ... said temperature controller is on board said processing unit.

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

- An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.
- An internal Keyboard Controller that contained the logic and A/D converter and transmit the information to the CPU to control the temperature, see figure 8 number 940.

The "Do Thermal Management" loop first goes and gets the CPU relevant temperature, then it computes the direction of the temperature, puts up the tick counts for later usage (e.g. how many times you need to slice to bring down the temperature). Getting the temperature is relatively simple, the system goes out and reads the value from a keyboard controller, from an A/D converter, etc. If an A/D converter is used, the equations in the program convert an A/D value over to some value of temperature based on a gradient, which is a little different for every system. Theoretically, you can normalize the gradient for any system if there are enough characterizations. As an example, in the program, the temperature of a Toshiba Case is measured against the temperature of the present system to compare the difference (37 degrees celsius versus the 37.25 degree celsius reading of the present system - as a result, any system can be benchmarked other systems in order to normalize the temperature gradient). Each of the zones has a corresponding temperature range. There are a series of tables in the program for computations that select the number of ticks are to be used to sleep the processor. An advantage of this embodiment of the invention is that it facilitates predictions of temperature zones when the temperature is increasing, decreasing, oscillating or stable. This facilitates table action or implements additional action by the system. The feed back loop in this embodiment has more

Claims and 92, 93, 94

92. (Previously presented) The apparatus of Claim 74, wherein said monitored temperature is detected via a temperature sensor coupled to said processing unit. (D)
93. (Previously presented) The apparatus of Claim 75, wherein said monitored temperature is detected via a temperature sensor coupled to said processing unit. (D)
94. (Previously presented) The apparatus of Claim 76, wherein said monitored temperature is detected via a temperature sensor coupled to said processing unit. (D)

(D) ... said monitored temperature is detected via a temperature sensor coupled to said processing unit.

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

- An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.
- An internal Keyboard Controller that contained the logic and A/D converter and transmit the information to the CPU to control the temperature, see figure 8 number 940.

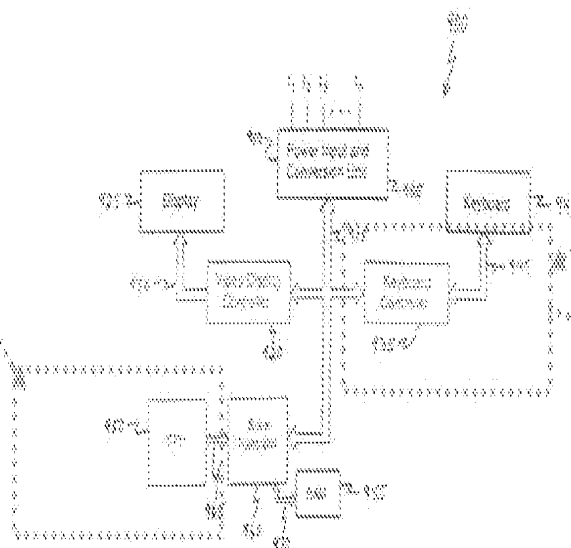


Fig. 8

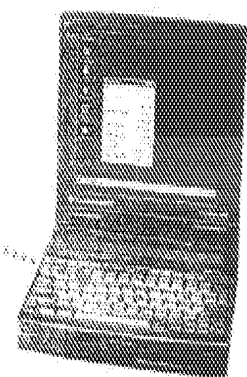


Fig. 9

92. (Previously presented) The apparatus of Claim 74, wherein said monitored temperature is detected via a temperature sensor coupled to said processing unit. (D)
93. (Previously presented) The apparatus of Claim 75, wherein said monitored temperature is detected via a temperature sensor coupled to said processing unit. (D)
94. (Previously presented) The apparatus of Claim 76, wherein said monitored temperature is detected via a temperature sensor coupled to said processing unit. (D)

(D) ... said monitored temperature is detected via a temperature sensor coupled to said processing unit.

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

- An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.
- An internal Keyboard Controller that contained the logic and A/D converter and transmit the information to the CPU to control the temperature, see figure 8 number 940.

The "Do Thermal Management" loop first goes and gets the CPU relevant temperature, then it computes the direction of the temperature, puts up the tick counts for later usage (e.g. how many times you need to slice to bring down the temperature). Getting the temperature is relatively simple, the system goes out and reads the value from a keyboard controller, from an A/D converter, etc. If an A/D converter is used, the equations in the program convert an A/D value over to some value of temperature based on a gradient, which is a little different for every system. Theoretically, you can normalize the gradient for any system if there are enough characterizations. As an example, in the program, the temperature of a Toshiba Case is measured against the temperature of the present system to compare the difference (37 degrees celsius versus the 37.25 degree celsius reading of the present system - as a result, any system can be benchmarked other systems in order to normalize the temperature gradient). Each of the zones has a corresponding temperature range. There are a series of tables in the program for computations that select the number of ticks are to be used to sleep the processor. An advantage of this embodiment of the invention is that it facilitates predictions of temperature zones when the temperature is increasing, decreasing, oscillating or stable. This facilitates table action or implements additional action by the system. The feed back loop in this embodiment has more

Claims 95, 96, 97.

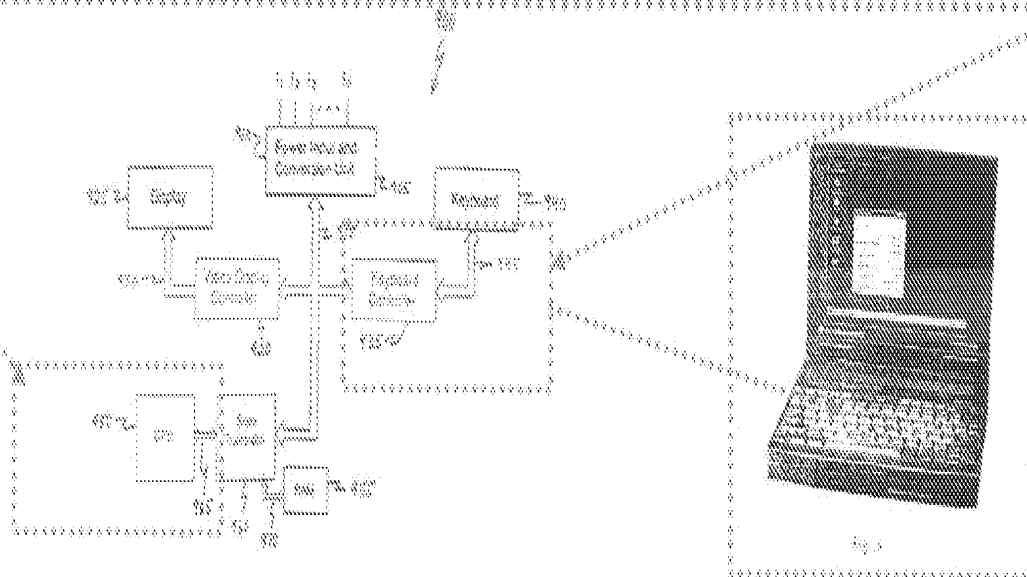
95. (Previously presented) The apparatus of Claim 74, wherein said temperature sensor is mounted within said processing unit. (D)
96. (Previously presented) The apparatus of Claim 75, wherein said temperature sensor is mounted within said processing unit. (D)
97. (Previously presented) The apparatus of Claim 76, wherein said temperature sensor is mounted within said processing unit. (D)

(D) ... said temperature sensor is mounted within said processing unit

This was a technology limitation at the time since it was quicker and less expensive to use an CPU that was commercially available at the time and place the temperature sensor adjacent to the CPU rather than built a CPU with the temperature sensor within it. However, for mass production, placing the temperature sensor within the processing unit would have been more cost effective and would have been the selected choice if the technology limitation at the time was removed.

* These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation
* of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype
* used

- * An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.
- * An internal Keyboard Controller that contained the logic and A/D converter and transmit the information to the CPU to control the temperature, see figure 8 number 940.



22 23 24

55 (Previously presented) The apparatus of Claim 74, wherein said temperature sensor is mounted within said processing unit. (3)

58. (Previously presented) The apparatus of Claim 75, wherein said temperature sensor is mounted within said processing unit. (C)

97. (Previously presented) The apparatus of Claim 75, wherein said temperature sensor is mounted within said processing unit. (C)

This was a technology limitation at the time since it was quicker and less expensive to use an CPU that was commercially available at the time and place the temperature sensor adjacent to the CPU rather than built a CPU with the temperature sensor within it. However, for mass production, placing the temperature sensor within the processing unit would have been more cost effective and would have been the selected choice if the technology limitation at the time was removed.

(C) ... said monitored temperature is detected via a temperature sensor coupled to said processing unit.

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

* An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.

- An internal Keyboard Controller that contained the logic and A/D converter and transmit the information to the CPU to control the temperature, see figure 8 number 940.

The "Do Thermal Management" loop first goes and gets the CPU relevant temperature, then it compares the direction of the temperature, puts up the tick counts for later usage (e.g. how many times you need to slice to bring down the temperature). Getting the temperature is relatively simple, the system goes out and reads the value from a keyboard controller, from an A/D converter, etc. If an A/D converter is used, the equations in the program convert an A/D value over to some value of temperature based on a gradient, which is a little different for every system. Theoretically, you can normalize the gradient for any system if there are enough characterizations. As an example, in the program, the temperature of a Toshiba Case is measured against the temperature of the present system to compare the difference (37 degrees celsius versus the 37.25 degree celsius reading of the present system - as a result, any system can be benchmarked other systems in order to normalize the temperature gradient). Each of the zones has a corresponding temperature range. There are a series of tables in the program for computations that select the number of ticks are to be used to sleep the processor. An advantage of this embodiment of the invention is that it facilitates predictions of temperature zones when the temperature is increasing, decreasing, oscillating or stable. This facilitates table action or implements additional action by the system. The feed back loop in this embodiment has more

Claims 98, 99, and 100

98. (Previously Presented) The apparatus of Claim 74, wherein said temperature sensor is mounted on a printed circuit board adjacent said processing unit. (C)

99. (Previously Presented) The apparatus of Claim 75, wherein said temperature sensor is mounted on a printed circuit board adjacent said processing unit. (C)

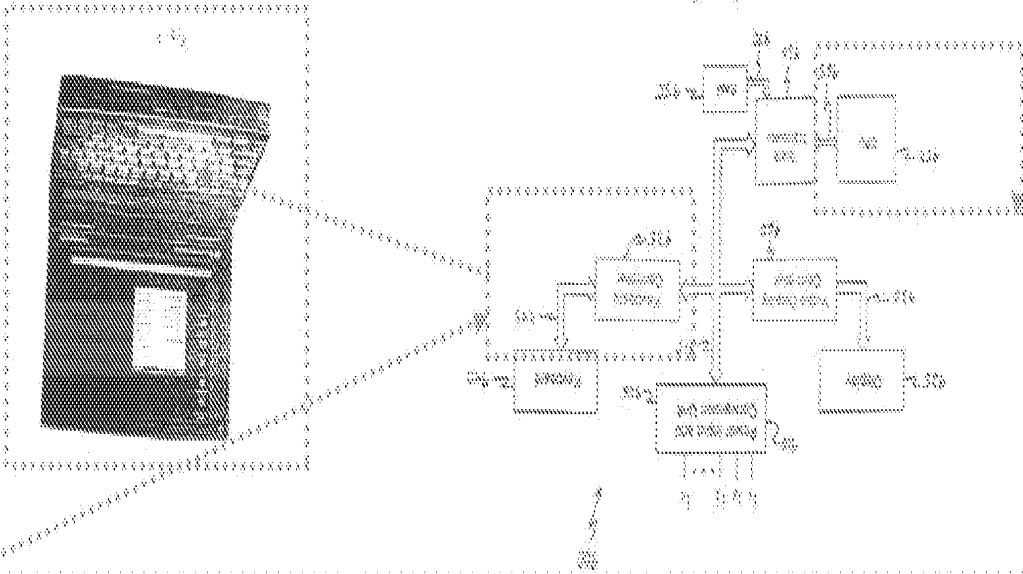
100. (Previously Presented) The apparatus of Claim 76, wherein said temperature sensor is mounted on a printed circuit board adjacent said processing unit. (C)

(C) ... said temperature sensor is mounted adjacent said processing unit.

This was a technology limitation at the time since it was quicker and less expensive to use an CPU that was commercially available at the time and place the temperature sensor adjacent to the CPU rather than build a CPU with the temperature sensor within it. However, for mass production, placing the temperature sensor within the processing unit would have been more cost effective and would have been the selected choice if the technology limitation at the time was removed.

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

- An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.
- An internal Keyboard Controller that contained the logic and A/D converter and transmit the information to the CPU to control the temperature, see figure 8 number 940.



98. (Previously Presented) The apparatus of Claim 74, wherein said temperature sensor is mounted on a printed circuit board adjacent said processing unit. (D)

99. (Previously Presented) The apparatus of Claim 75, wherein said temperature sensor is mounted on a printed circuit board adjacent said processing unit. (D)

100. (Previously Presented) The apparatus of Claim 76, wherein said temperature sensor is mounted on a printed circuit board adjacent said processing unit. (D)

This was a technology limitation at the time since it was quicker and less expensive to use an CPU that was commercially available at the time and place the temperature sensor adjacent to the CPU rather than built a CPU with the temperature sensor within it. However, for mass production, placing the temperature sensor within the processing unit would have been more cost effective and would have been the selected choice if the technology limitation at the time was removed.

(D) ... **said temperature sensor is mounted adjacent said processing unit.**

These claims are support by the fact the prototype (Page 26 line 6 to 12, Figure 6 is the representation of the prototype model) used for heat and power testing was completed by 9/15/1994 and the prototype used

- An Intel CPU (Central Processing Unit) see figure 8 number 950, figure 5 page 25 lines 7 to line 10.

- An internal Keyboard Controller that contained the logic and A/D converter and transmit the information to the CPU to control the temperature, see figure 8 number 940.

The "Do Thermal Management" loop first goes and gets the CPU relevant temperature; then it computes the direction of the temperature, puts up the tick counts for later usage (e.g. how many times you need to alic to bring down the temperature). Getting the temperature is relatively simple, the system goes out and reads the value from a keyboard controller, from an A/D converter, etc. If an A/D converter is used, the equations in the program convert an A/D value over to some value of temperature based on a gradient, which is a little different for every system. Theoretically, you can normalize the gradient for any system if there are enough characterizations. As an example, in the program, the temperature of a Toshiba C400 is measured against the temperature of the present system to compare the difference (37 degrees celsius versus the 37.25 degree celsius reading of the present system - as a result, any system can be benchmarked other systems in order to normalize the temperature gradient). Each of the zones has a corresponding temperature range. There are a series of tables in the program for computations that select the number of ticks are to be used to sleep the processor. An advantage of this embodiment of the invention is that it facilitates predictions of temperature zones when the temperature is increasing, decreasing, oscillating or stable. This facilitates table action or implements additional action by the system. The feed back loop in this embodiment has more

Claims 104, 105, and 106

104. (Previously presented) The apparatus of Claim 101, wherein the frequency of said temperature sensing changes as said temperature reaches preselected threshold values. (A)
105. (Previously presented) The apparatus of Claim 102, wherein the frequency of said temperature sensing changes as said temperature reaches preselected threshold values. (A)
106. (Previously presented) The apparatus of Claim 103, wherein the frequency of said temperature sensing changes as said temperature reaches preselected threshold values. (A)

(A) ... the frequency of said temperature sensing changes as said temperature reaches preselected threshold values.

EXHIBIT I-3

```

;
;       OSC, so set the temp level up by one
;
mov     bh,00000000b           ;Force downward
cmp     al,7                   ;Already at max?
je      NotTR_OSC              ;yes, leave alone
inc     al                     ;Force level temp up by one
NotTR_OSC:

```

NotTR_OSC:

```

;
;       Time needs to be set based on T Level
;
mov     ah,7                   ;Max available
sub     ah,al                   ;7-7 = 0 so watch it!
cmp     ah,0
jne     NotBig2                ;Not zero
inc     ah                     ;look at every minute
NotBig2:shl     ah,2             ;Align the time constant
or      ah,bh                  ;Align the direction
or      ah,al                   ;Align the TRange
mov     di,al                   ;TRange
mov     bh,0                    ;Upper index.

```

```

;
;       Need to setup the Doze Value based on current TRange
;
push    ex

```

```

IFDEF   rz2lilyp               ;5.08.1 6-3-95vw Set Doze
value
mov     ah,byte ptr cs:TDozeTable[bx]
mov     al,54h                  ; Index register to write
call    CfgWrite

```

Sample period time based on Temperature Level

EXHIBIT V-84

104. (Previously presented) The apparatus of Claim 101, wherein the frequency of said temperature sensing changes as said temperature reaches preselected threshold values. (A)
105. (Previously presented) The apparatus of Claim 102, wherein the frequency of said temperature sensing changes as said temperature reaches preselected threshold values. (A)
106. (Previously presented) The apparatus of Claim 103, wherein the frequency of said temperature sensing changes as said temperature reaches preselected threshold values. (A)

(A) ... the frequency of said temperature sensing changes as said temperature reaches preselected threshold values.

Modifies clock signal changing frequency of sensing temperature -- how quickly or long it is between samples.

Pre-selected threshold values

Need to setup the Grrp Value based on current TRange

```
IFDEF xallilyp          ;5.08.1 6-3-95w Set Grrp
;-----
mov     dx,byte ptr ds:TDozTable[dx]
mov     si,3*3          ; Index register to write
call    CfgWrite
ENDIF ;xallilyp
```

```
IFDEF xallilyp          ;5.08.1 6-3-95w Add Code
code here
ENDIF ;xallilyp
```

```
push    dx              ; Minutes to next scan
WriteDownCount()
mov     si,3*3
call    CfgWrite        ; Write it out
LeaveDownCount()
pop     dx
pop     dx
pop     dx              ; Restore Interrupts
RET
```

```
TDozTable:
db      00h              ; Disabled
db      30h              ; 1 sec
db      30h              ; 1 sec
db      20h              ; 1/2 sec
db      20h,20h,20h,20h ; 4 40b 5-11-95
;      db      20h        ; 1/4 sec
```

EXHIBIT I-3

TRange	Label	byte
0CTempRange	Label	byte
db	00h	(Level: 0)
db	00h	(Level: 1)
db	10h	(Level: 2)
db	10h	(Level: 3)
db	14h	(Level: 4)
db	14h	(Level: 5)
db	18h	(Level: 6)
db	18h	(Level: 7)
ADTempRange	Label	byte
db	10h	(Level: 0)
db	10h	(Level: 1)
db	10h	(Level: 2)
db	10h	(Level: 3)
db	11h	(Level: 4)
db	11h	(Level: 5)
db	20h	(Level: 6)
db	20h	(Level: 7)

OpDataTemperature endp

EXHIBIT I-3

Temperature

Note: The Macro "IFDEF" was added on 6-3-95 because This code was used for another Product also called lilyp. The original code that was Working by 9/15/94 is there, the Macro for lilyp does not have Any code generation as of yet Here since it was not written for The new product. As faster processors were added to lilyp products, the tables changed to under them also (see 4.43b 5-11-95)

EXHIBIT V-85

Claims 107, 108, and 109

107. (Previously presented) The apparatus of Claim 101, wherein the frequency of said temperature sensing is user modifiable. (D)

108. (Previously presented) The apparatus of Claim 102, wherein the frequency of said temperature sensing is user modifiable. (D)

109. (Previously presented) The apparatus of Claim 103, wherein the frequency of said temperature sensing is user modifiable. (D)

Auto/on/off set by user in SETUP

Implementation functional
For prototype and patent purposes
By 3-24-1995

```
smart range coded added 1-12-95vw
Allow User to select which range of thermal management he
wants
Power Saving = ON --DC range
                OFF --AC range
                AUTO -If AC operation, using AC range
                    -If DC operation, using DC range
```

EXHIBIT I-7

(D) ... the frequency of said temperature sensing is user modifiable

1-24-95 Added Auto/On/off selection

```
mov     $1,66h
call    CmosRead          ;Get Auto/On/Off Selection
```

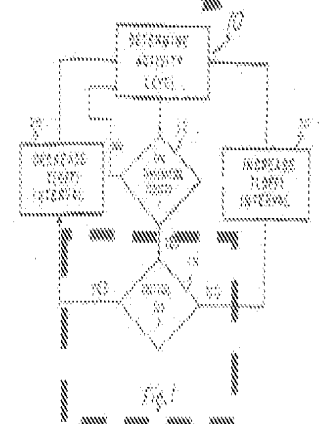
Note: this feature was added after code was converted to ROM based needed for production as an enhancement to technology in Mar 1995. Dischler did NOT provide auto selection by user.

Claims 110

110. (Previously presented) The apparatus of Claim 74, wherein said clock manager avoids selectively stopping clock signals from being sent to said processing unit when said processing unit is processing critical I/O. (F)

(F) ... said clock manager avoids selectively stopping clock signals from being sent to said processing unit when said processing unit is processing critical I/O.

consumption is reduced from the E(max) state. In order to align the T(off) intervals with periods of CPU inactivity, the CPU activity and temperature levels are used to determine the width of the T(off) intervals in a closed loop. FIG. 1 depicts such a closed loop. The activity level of the CPU is determined at Step 10. If CPU temperature is not a concern (Step 12), the activity level of the CPU is again determined (Step 10). If CPU temperature is a concern, a determination is made (Step 14) as to whether or not critical I/O is being performed. If critical I/O is being performed, the present invention increases the T(off) interval (Step 20) and returns to determine the activity level of the CPU again. If, on the other hand, critical I/O is not being performed, the present invention decreases the T(off) interval (Step 30) and proceeds to again determine the activity level of the CPU. Thus the T(off) intervals are constantly being adjusted to match the system activity level and control the temperature level of the CPU.



Claims 111

111. (Previously presented) The apparatus of Claim 75, wherein said processing unit receives said first clock signal while processing critical I/O regardless of said one of: a) said monitored temperature rises to at least a selected reference temperature level, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

(F) ... said processing unit receives said first clock signal while processing critical I/O regardless of said one of: a) said monitored temperature rises to at least a selected reference temperature level, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

period adjusts itself in response to CPU temperature. Performance taken away from the user during power conservation and thermal management control is balanced against critical I/O going on in the system.

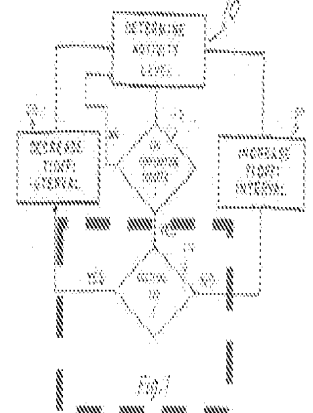
Existing thermal management systems turn on and stay on until the CPU temperature goes down. Unfortunately, this preempts things in the system. Such is not the case in the environment of the present invention. The same sleep manager has global control. As an example, while CPU temperature may be rising or have risen to a level of concern, the system may be processing critical I/O, such as a wave file being played. With critical I/O, the system of the present invention will play the wave file without interruption even though the result may be a higher CPU temperature. CPUs do not typically overheat all at once. There is a temperature rise gradient. The system of the present invention takes advantage of the temperature rise gradient to give a user things that affect the user time slices and take it away from him when its not affected.

Claims 112

112. (Previously presented) The apparatus of Claim 76, wherein said clock manager avoids reducing said processing unit clock speed when said processing unit is processing critical I/O. (F)

(F) ... said clock manager avoids reducing said processing unit clock speed when said processing unit is processing critical I/O.

consumption is reduced from the E(max) state. In order to align the T(off) intervals with periods of CPU inactivity, the CPU activity and temperature levels are used to determine the width of the T(off) intervals in a closed loop. FIG. 1 depicts such a closed loop. The activity level of the CPU is determined at Step 10. If CPU temperature is not a concern (Step 12), the activity level of the CPU is again determined (Step 10). If CPU temperature is a concern, a determination is made (Step 14) as to whether or not critical I/O is being performed. If critical I/O is being performed, the present invention increases the T(off) interval (Step 20) and returns to determine the activity level of the CPU again. If, on the other hand, critical I/O is not being performed, the present invention decreases the T(off) interval (Step 30) and proceeds to again determine the activity level of the CPU. Thus the T(off) intervals are constantly being adjusted to match the system activity level and control the temperature level of the CPU.



Claim 113

113. (Previously presented) The apparatus of Claim 74 wherein said clock manager selectively restores said processing unit clock speed when said monitored temperature drops to at least a selected reference temperature. (C)

④ said clock manager selectively restores said processing unit clock speed when said monitored temperature drops to at least a selected reference temperature.

```

      .align 4,0x00000000      ;Align the time constant
      or     0x00000000      ;Align the direction
      or     0x00000000      ;Align the shape
      mov    0x00000000      ;Change
      ror    0x00000000      ;Rotate index.

```

Need to setup the Data Value based on current Phase

```

push    ax
;-----
IFDEF    _realtime
;5.00.1 6-1-85rc Get Date
value
;-----
mov     ax,byte ptr cs:TimeTable[0x]
mov     al,60
; Index register to write
call    crqWrite
ENDIF    _realtime

;-----
IFDEF    _realtime
;5.00.1 6-1-85rc Add Date
Code Here
ENDIF    _realtime

;-----
pop     ax
; Minutes to next day
WriteDownCount:
mov     al,99h
call    crqWrite
; write it out
LeaveDownCount:
pop     bx
pop     ax
pop     ;Restore interrupts
ret

```

```

#Disable:
db 500 : Disabled
db 100 : 1 sec/s
db 100 : 1 sec
db 100 : 1/2 sec
db 100,100,100,100,100 : 4480 3-11-95
: db 100 : 1/4 sec

```

CONCLUSIONS

Implementational Guidance
For privacy and patient purposes
By 9/15/2014

```

=====
TempRange      label  byte
-----
ACTempRange    label  byte
              @b    0xb    level: 0
              @b    0xc    level: 1
              @b    0xd    level: 2
              @b    0xe    level: 3
              @b    0xf    level: 4
              @b    0x0    level: 5
              @b    0x1    level: 6
              @b    0x2    level: 7

ACTempRange    label  byte
-----
              @b    0xa    level: 0
              @b    0xb    level: 1
              @b    0xc    level: 2
              @b    0xd    level: 3
              @b    0xe    level: 4
              @b    0xf    level: 5
              @b    0x0    level: 6
              @b    0x1    level: 7

=====
declareTemperature endc
=====

```

5232-24

TRange different for AC or Battery operation. Index of zero (0) will be for Level 0 in table, etc.

As Temperature lowers, the index is reduced until the index reached zero (0). The index within the TDozeTable indicates the clock speed to be selected. An index of zero (0) disables the second clock and restores the first clock speed.

EXPORT V-30

Claim 116

116. (Previously presented) The apparatus of Claim 75, wherein said clock manager further designates that said processing unit receives said first clock signal when said monitored temperature drops to at least a selected reference temperature. (C)

© said clock manager further designates that said processing unit receives said first clock signal when said monitored temperature drops to at least a selected reference temperature

[illegible]

RPMF msllyps #S.OB-1 6-3-98% Set Done

```
--value -----
--mov    rdi,%rax; mov(%rdi,%r0,%rax) -----
--mov    al,%eax ; Index register to write
--call   %eax
--push   %eax
```

15.08.16 6:43 PM Add done

2000 1000
 2000 1000

[illegible][illegible]

Q. Now, did you see the defendant at the time he was arrested?

[illegible]

Figure 6

Figure 1. The effect of the concentration of the *Agaricus bisporus* spores on the growth of *Aspergillus fumigatus* on the agar medium. The growth of *A. fumigatus* was measured by the optical density of the culture at 600 nm. The concentration of the *A. bisporus* spores was 10² (□), 10³ (○), 10⁴ (△), 10⁵ (◇), 10⁶ (▽) and 10⁷ (×) spores/ml. The error bars represent the standard deviation of the triplicate.

[illegible]

www.elsevier.com/locate/jmb

6688 • J. Neurosci., September 24, 2008 • 28(39):6682–6692

[illegible][illegible][illegible]

Figure 1. Schematic representation of the experimental design. The subjects were divided into two groups: a control group (CG) and an experimental group (EG). The CG was exposed to a control environment (CE) and the EG was exposed to an experimental environment (EE). The EE was designed to simulate a real-world environment with various stimuli (e.g., traffic, noise, etc.). The subjects were exposed to the EE for a period of 10 days. The results of the experiment are shown in the table below.

CHRYSLER [W]

\mathbb{Z}^n

.....

Temperature lowers the index is reduced until

temperature levels, the index is reduced until

the index within the TDozeTable indicates the clock

INDEX within the TOC/FBIV indicates the web

index of zero (0) disables the second clock and

index of zero (0) indicates the second visit and

EXHIBIT

WATERMAN

Modifies clock signal
When bx=0, first clock signal

TempRange	label	byte
TempRange	label	byte
40	0x0	level 0
40	0x0	level 1
40	0x0	level 2
40	0x0	level 3
40	0x0	level 4
40	0x0	level 5
40	0x0	level 6
40	0x0	level 7

Age/sex	Level	Time
60	Level 0	100
60	Level 1	100
60	Level 2	100
60	Level 3	100
60	Level 4	100
60	Level 5	100
60	Level 6	100
60	Level 7	100

Abstract

2000-2001

TRange different for AC or Battery operation. Index of zero (0) will be for Level 0 in table, etc.

As Temperature lowers, the index is reduced until the index reached zero (0).

The index within the TDozeTable indicates the clock speed to be selected.

An index of zero (0) disables the second clock and restores the first clock signal.

EXHIBIT V-99

Claim 117 and 118

117. (Previously presented) The apparatus of Claim 75, wherein said clock manager designates that said processing unit receives said first clock signal in response to detection of a critical operation, regardless if one of: a) said monitored temperature rises to at least a elected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (F)
118. (Previously presented) The apparatus of Claim 75, wherein said clock manager designates that said processing unit receives said first clock signal in response to processing of a critical operation, regardless if one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate. (F)

(F) ... said clock manager designates that said processing unit receives said first clock signal in response to processing of a critical operation, regardless if one of: a) said monitored temperature rises to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are rising at a faster than acceptable rate.

period adjusts itself in response to CPU temperature. Performance taken away from the user during power conservation and thermal management control is balanced against critical I/O going on in the system.

Existing thermal management systems turn on and stay on until the CPU temperature goes down. Unfortunately, this preempts things in the system. Such is not the case in the environment of the present invention. The same sleep manager has global control. As an example, while CPU temperature may be rising or have risen to a level of concern, the system may be processing critical I/O, such as a wave file being played. With critical I/O, the system of the present invention will play the wave file without interruption even though the result may be a higher CPU temperature. CPUs do not typically overheat all at once. There is a temperature rise gradient. The system of the present invention takes advantage of the temperature rise gradient to give a user things that affect the user time slices and take it away from him when its not affected.

Claim 119

119. (Previously presented) The apparatus of Claim 76, wherein said clock manager raises said reduced processing unit clock speed when said monitored temperature drops to at least a selected reference temperature. (D)

(D) said clock manager further designates that said processing unit receives said first clock signal when said monitored temperature drops to at least a selected reference temperature

```

;-----
; Align the time constant
; Align the direction
; Align the TRange
; Range
; Upper index.
;
; Need to setup the Doze Value based on current TRange
;
push    bx

```

```

;-----
; 15.08.1 6-3-99w Set Doze
; Value
;
mov     bx, 0
; Index register to write
;
call    WriteWrite
;
;-----

```

```

;-----
; 15.08.1 6-3-99w Add doze
; code here
;
;-----

```

```

;-----
; Minutes to next scan
;
; WriteDownCountT:
;
; Write it out
;
; LeaveDownCountT:
;
;
; Restore Interrupts
;
;
;

```

```

;-----
; TDozeTable:
;
; 00h : Disabled
; 10h : 1/2 sec's
; 20h : 1 sec
; 30h : 1 1/2 sec
; 40h : 2 sec
; 50h : 3 sec
; 60h : 4 sec
; 70h : 5 sec
; 80h : 6 sec
; 90h : 7 sec
; A0h : 8 sec
; B0h : 9 sec
; C0h : 10 sec
; D0h : 11 sec
; E0h : 12 sec
; F0h : 13 sec
;
;
;

```

EXHIBIT V-93

Modifies clock signal
When bx=0, first clock signal.
As temperature lowers, the
Bx value lowers and the clock
Speed increases (raises the
Current reduced clock speed).
See TDozeTable. For example,
Bx=3 raises the reduced clock speed
Of Bx=4 or higher.

15.08.1 6-3-99w
15.08.1 6-3-99w
15.08.1 6-3-99w

TRange different for AC or Battery
operation. Index of zero (0) will be
for Level 0 in table, etc.

As Temperature lowers, the index is reduced until the index reached zero (0). The
index within the TDozeTable indicates the clock speed to be selected. An index of
zero (0) disables the second clock and restores the first clock signal.

Claim 122

122. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of: a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate. (U)

.....
(T) a temperature controller ...
.....

The Clock Manager – receives control signal from temperature controller

The Temperature Controller

DoXBThermalRead:

```

:      Try for a Thermal Management hit: return time count = 0
:      then
:      we had one, else we need to leave it along.

```

```

:      .....
:      .....
:      .....

```

```

:      call    UpdateTemperature    ;Do it
:      mov     al,lah

```

```

:      call    CmosRead             ;Read Temperature byte
:      .....
:      mov     al,ah                ;Direction/Time/Level
:      .....
:      and     ah,7fh               ;Just the time and level

```

```

:      please
:      mov     bh,al                ;Get the direction
:      and     al,7                 ;Level computed for Temp
:      range
:      and     bh,11000000b         ;Direction

```

```

:      cmp     ah,0                 ;Good read?
:      jne     LeaveDownCount?     ;No, leave it alone
:      .....

```

```

:      This is where we do some thermal management
:      Hold ah value or reset it as needed...
:      .....

```

```

:      cmp     bh,11000000b         ;OSC?
:      jne     NotTR_OSC           ;No!

```

Leaves clock speed the same

Temperature Controller
for the clock manager
to raise the clock speed

EXHIBIT I-2

EXHIBIT V-94

122. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of: a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate. (U)

(T) a temperature controller ...

The Temperature Controller

CONFIDENTIAL

Read the Temperature On the system board controlled by
Keyboard Controller

Calling Arguments

[illegible]

On exit, the cmos parameter will contain the correct

```

mov     al,0x04             ;Output DMA read A/D.      ***<-- in    al,0x04             ;full. then, get A/D value
***<-- out   $4h,al
        testnb(2)
loop    restkb_2_okay       ;3-10-95w Don't hang here          cmp     al,0xffh           ;valid value?
jnp     ClearBusyKeyChannel ;3-13-95w Should we clear?         je      ClearBusyKeyChannel ;Nop! 3-17-95w
                                   ;DEEPS COOL..Waits 3-12-95w INACTIVE
here?:   restkb_2_okay:       ;3-10-95w                        cmp     al,0x04h          ;
loop    $+1                 ;                                     je      ClearBusyKeyChannel ;Nop! 3-17-95w
***<-- in    $+1             ;read status port                push    ax
in       al,$4h              ;                                     mov     ah,05h
loop    $+1                 ;                                     mov     al,ah
jnz     $+2                  ;                                     xchg    al,ah
test    al,1                 ;check status of input port

```

XINXIN 2-3

2007-2008

Reads Temperature for
starting point

Register al contains temperature

Channel 64 was changed to 34 and 60 was changed to 30 after 9/15/94. Does not affect invention, just make product work better for multitasking operating systems. Same temperature was obtained either way. Channels 60 and 64 used for FCC and UL agency testing. Implementation was functional and complete for patent purpose by 9/15/94.

EXHIBIT 8-99

122. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of: a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate. (U)

(T) a temperature controller ...

SetRange:
The Temperat xchg al,cl ;Al has temp back; ah=index
Controller mov cx,7 ;cx = loop count

ScanRange:
 mov bx,cx
 add bl,ah ;Over index for ac or dc
 cmp al,byte ptr cs:[TempRange+bx]
 jg FoundRange ;cx=range number found
 loop ScanRange
FoundRange: ;cx=range number found

Temperature for starting
point - Register al contains
temperature

122. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of: a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate. (U)

(T) a temperature controller ...

```
SetRange:
    mov     al,cl          ;Al has temp back's shindex
    mov     cx,7           ;CX = loop count
```

```
ScanRange:
    mov     bx,cx
    add     bl,sh          ;Over index for al or dx
    cmp     al,byte ptr ds:[TempRange+bx]
    jg      FoundRange     ;Overrange number found
    loop    ScanRange
```

```
FoundRange:
    ;Overrange number found
```

```
    mov     al,00h         ;Send Heyward channel
    scasd   flag
    call    OneRead
    mov     al,sh
    and     al,3           ;Least temperature range
    and     ax,0000h       ;Upper direction trend value
    cmp     cl,al          ;Value of one's read
    jg      RangeStable    ;Stable process, same range
    jg      RangeUpward    ;New range is greater than
```

```
old one
;Range is downward trend
```

```
    cmp     ah,100000000b   ;Last one upward?
    je      RangeOSC       ;Yes, found osc
```

```
    mov     ch,01h
    jmp     short AllRange
```

```
RangeOSC:
    mov     ch,0000h       ;OSC flag
    jmp     short AllRange
```

```
RangeStable:
    mov     ch,00h
    jmp     short AllRange
```

```
RangeUpward:
    cmp     ah,010000000b   ;Last one Downward?
    je      RangeOSC       ;Yes, Osc found
    mov     ch,10
```

```
AllRange:
    or      ch,cl          ;Range and range temp trend
    mov     ah,cl
    mov     al,10h         ;Note that 1 bit inter 1
    bits    for status outputs
    call    OneWrite
```

```
ClearKeywayChannel:
    mov     ax,000100h     ;Free Channel
    mov     bl,100000000b   ;max to write
    call    OneWriteBack   ;Bit updated
```

```
BusyKeyChannel:
    pop     cx             ;1-10-00w
    pop     bx             ;1-10-00w
    pop     ax             ;1-10-00w
    mov     byte ptr [0],0 ;Record status and
```

EXHIBIT V-9

Predicting future changes
By studying trend to be downward,
Upward, stable, or oscillating.

Temperature controller
For predicting and alerting
B. V. 1. 1. 1.

122. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of: a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate. (U)

(M) a a clock manager ...

The Clock Manager – receives control signal from temperature controller

The Temperature Controller

```

DoKBTThermalRead:
;
; Try for a Thermal Management hit: return time count = 0
;
; we had one, else we need to leave it along.
;
; * * * * *
; call UpdateTemperature ;Do it
; mov al,1ah
; call CmosRead ;Read Temperature byte
; mov al,ah ;Direction/Time/Level
; and ah,3ah ;Just the time and level
;
; please
; mov bh,al ;Get the direction
; and al,7 ;Level computed for Temp
; range
; and bh,11000000b ;Direction
;
; cmp ah,0 ;Good read?
; jne LeaveDownCountT ;Nop, leave it alone
;
; This is where we do some thermal management
; Hold ah value or reset it as needed...
;
; * * * * *
; cmp bh,11000000b ;OSC?
; jne NotTR_OSC ;Nop!

```

Leaves clock speed the same

Intel Patent 6,440,000
 Filed 12/15/00
 Intel Corp.

EXHIBIT I-2

EXHIBIT V-98

122. (Previously presented) An apparatus, comprising:

a **temperature controller** (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a **clock manager** (M) adapted to receive a control signal from said temperature controller, said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of: a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate. (U)

(U) ... said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of:
a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate.

```
; OSC, so set the temp level up by one
;
mov     bh,00000000h      ;Force downward
cmp     al,7              ;Already at max?
je      NotTR_OSC         ;yep, leave alone
inc     al                ;force level temp up by one
NotTR_OSC:
;
;      Time needs to be set based on T Level
;
mov     ah,7              ;Max available
sub     ah,al              ;7-7 = 0 so watch it!
cmp     ah,0
jne     NotBig2            ;Not zero
inc     ah                ;look at every minute
NotBig2:shl     ah,3        ;Align the time constant
or      ah,bh              ;Align the direction
or      ah,al              ;Align the TRange
mov     bl,al              ;TRange
mov     bh,0              ;Upper index.

;      Need to setup the Doze Value based on current TRange
;
push    ax

IFDEF   rxllilyp           ;5.08.1 6-3-95rv Set Doze
value
mov     ah,byte ptr cs:TDozeTable[bx]
mov     al,54h             ; Index register to write
call    cfgWrite
```

Temperature Controller
Monitors temperature
and predicts future
changes

Rising or Lowering at
Acceptable rate, if
index goes down,
clock speed goes up-
Clock frequency
increases. Direction
will indicate downward
trend.

Computes Clock
Speed

Receive clock
speed to set for
processor (CPU)

122. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of: a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate. (U)

(U) ... said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of:
a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate.

Modifies clock speed, clock frequency

need to setup new Dots Value based on current TRange

```

IFDEF x86llyp          ;5.05.1 6-3-95w Set Dots
value
mov     ah,byte ptr ds:TDexorable[0x]
mov     al,50h          ; index register to write
call    CfgWrite
ENDIF x86llyp

IFDEF x86llyd          ;5.05.1 6-3-95w add dots
code here
ENDIF x86llyd

pop     ax               ; Minutes to next scan
WriteDownCountT:
mov     al,10h
call    CheckWrite      ; Write it out
LeaveDownCountT:
pop     cx
pop     ax
popfd                    ;Restore Interrupts
ret

```

```

TDefault:
db      00h              ; Disabled
db      10h              ; 1 sec's
db      10h              ; 1 sec
db      20h              ; 1/2 sec
db      20h,20h,20h,20h ; 4.48b 5-11-95
; db      30h              ; 1/4 sec

```

EXHIBIT L-3

TempRange	label	byte
0CTempRange	label	byte
db	00h	Level 0
db	00h	Level 1
db	10h	Level 2
db	10h	Level 3
db	10h	Level 4
db	10h	Level 5
db	10h	Level 6
db	10h	Level 7

ACTempRange	label	byte
db	10h	Level 0
db	10h	Level 1
db	10h	Level 2
db	10h	Level 3
db	10h	Level 4
db	10h	Level 5
db	10h	Level 6
db	10h	Level 7

updateTemperature ends

EXHIBIT L-4

Note: The Macro "FDEF" was added on 6-3-95 because This code was used for another Product also called llyd. The original code that was Working by 9/15/94 is there, the Macro for llyd does not have Any code generation as of yet Here since it was not written for The new product. As faster processors were added to The new product, the tables changed to under them also (see 4.48b 5-11-95)

Reference Temperature

EXHIBIT V-100

122. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of: a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate. (U)

(U) ... said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of:
a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate.

EXHIBIT I-3

```

:
:      OSC, so set the temp level up by one
:
:
:      mov     bh,00000000b      ;force downward
:      → cmp    al,7              ;Already at max?
:      je      NotTR_OSC         ;yep, leave alone
:      → inc    al                ;force level temp up by one
:
:      NotTR_OSC:
:
:      Time needs to be set based on T Level
:
:
:      mov     ah,7              ;Max available
:      sub     ah,al              ;7-7 = 0 so watch it!
:      cmp     ah,0
:      jne     NotBigI           ;Not zero
:      inc     ah                ;look at every minute
:      NotBigI:shl     ah,3       ;Align the time constant
:      or      ah,bh             ;Align the direction
:      or      ah,al             ;Align the TRange
:      mov     bl,al             ;TRange
:      mov     bh,0              ;Upper index.

```

Tlevel sets time – based on acceptable level of temperature rise or fall (direction gives rise or fall, and TRange give temperature Low and Max in range.

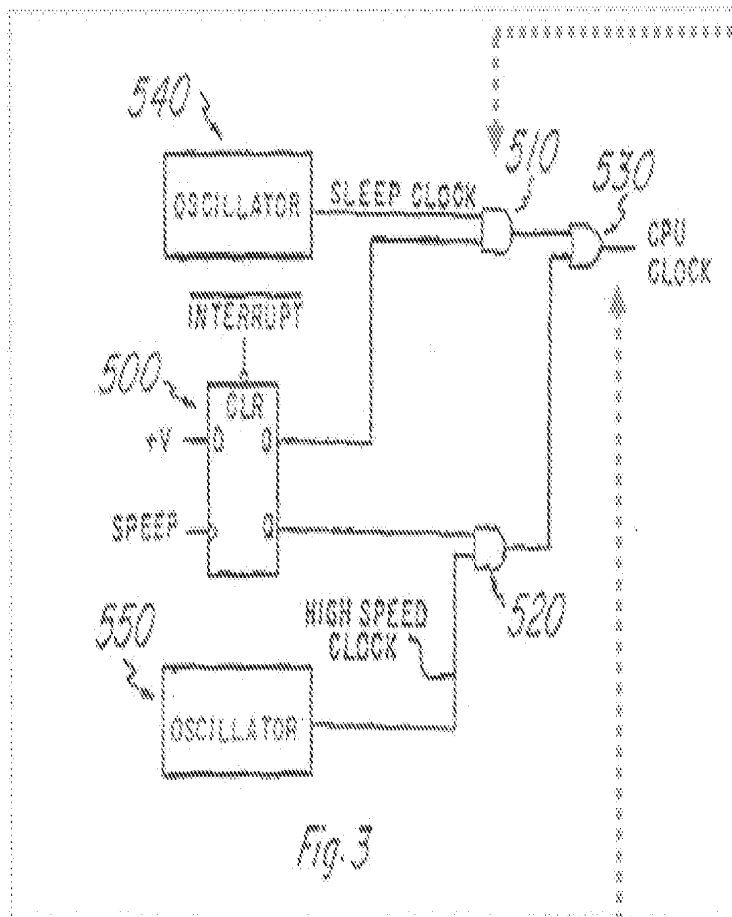
Acceptable rate is time and temperature based dependent on direction of trend.

EXHIBIT V-101

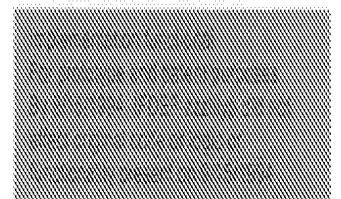
122. (Previously presented) An apparatus, comprising:

a temperature controller (T) for monitoring temperature within said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of: a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate. (U)

(U) ... said clock manager selectively raising the frequency of clock signals being sent to a processing unit when one of:
a) said monitored temperature drops to at least a selected reference temperature, and b) said predicted changes in said monitored temperature are at an acceptable rate.



Rising faster than
Acceptable rate,
forces second
clock signal



Computes Clock
Signal

Receive a First or
Second clock
signal

Claim 123

123. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(T) a temperature controller ...

DoXBThermalRead:

The Clock Manager -- receives control signal from temperature controller

```
    Try for a Thermal Management hit: return time count = 0
then
    we had one, else we need to leave it along.
```

The Temperature Controller

```
    call    UpdateTemperature    ;Do it
    mov     al,3ah
    call    CmosRead             ;Read Temperature byte
    ..... ;Direction/Time/Level
    mov     al,ah
    ..... ;Just the time and level
    and     ah,3ah
    please
    mov     bh,al                ;Get the direction
    and     al,7                 ;Level computed for Temp
    range
    and     bh,11000000b         ;Direction

    cmp     ah,0                 ;Good read?
    jne     LeaveDownCountT      ;Nop, leave it along
    .....
    :
    :   This is where we do some thermal management
    :   Hold ah value or reset it as needed...
    :
    .....
    cmp     bh,11000000b         ;OSC?
    jne     NotTR_OSC            ;Nop!
```

Leaves clock speed the same

EXHIBIT I-2

EXHIBIT V-103

123. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(T) a temperature controller ...

The Temperature
Controller

EXHIBIT I-4

```

:
:   Read the Temperature on the system board controlled by
Keyboard Controller
:
:   Calling Arguments
:
:   Call   UpDateTemperature
:   ON exit, the cmos parameter will contain the correct
values
:

```

```

mov     al,0x4b          ;Output the read A/D.
*** out     $4b,%al
testKbc_2:
loop    testKbc_2_Okay    ;1-30-95w Don't hang here
jnp     ClearBusyKeyChannel ;1-30-95w?Should we (loop
here?
testKbc_2_Okay:          ;1-30-95w
jnp     $+2
*** in     al,$4b        ;read status port
jnp     $+2
jnp     $+2
test     al,2             ;check status of input port

*** in     al,80h         ;full, then, get A/D value
cmp     al,0ffh          ;valid value?
je      ClearBusyKeyChannel ;Nop! 1-17-95w
;DEBUG CODE...Waits 1-12-95w INACTIVE
cmp     al,00h
je      ClearBusyKeyChannel ;Nop! 1-17-95w
push    ax
mov     ah,80h
xchg    al,ah

```

EXHIBIT I-5

EXHIBIT I-6

Reads Temperature for
starting point

Register al contains temperature

Channels 64 was changed to 54 and 60 was changed to 50 after 9/15/94. Does not affect invention, just makes product work better for multitasking operating systems. Same temperature was obtained either way. Channels 60 and 64 used for FCC and UL agency testing. Implementation was functional and complete for patent purpose by 9/15/94.

EXHIBIT V-104

123. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(T) a temperature controller ...

The Temperature Controller	SetRange:	-- * xchg	al,cl	;Al has temp back; ah=index
		mov	cx,7	;CX = loop count
EXHIBIT I-8	ScanRange:			
		mov	bx,cx	
		add	bl,ah	;Over index for ac or dc
		cmp	al,byte ptr cs:[TempRange+bx]	
		jg	FoundRange	;CX=range number found
	loop	ScanRange		
	FoundRange:			;CX=range number found

Temperature for starting point - Register al contains temperature

Temperature for starting point - Register al contains temperature

123. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(M) a clock manager ...

The Clock Manager – receives control signal from temperature controller

DoKBTThermalRead:

```

; Try for a Thermal Management hit: return time count = 0
then
; we had one, else we need to leave it along.
```

The Temperature Controller

```

; *****
; call    UpdateTemperature    ;Do it
; mov     al,3ah
; call    CmosRead             ;Read Temperature byte
; mov     al,8h                ;Direction/time/Level
; and     ah,10h               ;Just the time and level
; please
; mov     bh,al                ;Get the direction
; and     al,7                 ;Level computed for Temp
; range
; and     bh,11000000b         ;Direction
;
; cmp     ah,0                 ;Good read?
; jne     LeaveDownCountT     ;No, leave it alone
;
; This is where we do some thermal management
; Hold ah value or reset it as needed...
;
; cmp     bh,11000000b        ;OSC?
; jne     NotTR_OSC           ;No!
```

Leaves clock speed the same

Temperature Controller
Program and data memory
Bus interface

EXHIBIT I-2

EXHIBIT V-107

123. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(U) ... said clock manager selectively stopping clock signals from being sent to a processing unit when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature

```
; OSC, so set the temp level up by one
;
mov     bh,00000000b           ;Force downward
cmp     al,7                   ;Already at max?
je      NotTR_OSC              ;yep, leave alone
inc     al                     ;force level temp up by one
NotTR_OSC:
;
;   Time needs to be set based on T Level
;
mov     ah,7                   ;Max available
sub     ah,al                   ;7-7 = 0 so watch it!
cmp     ah,0
jne     NotBig2                ;Not zero
inc     ah                     ;look at every minute
NotBig2:and     ah,3            ;Align the time constant
or      ah,bh                  ;Align the direction
or      ah,al                   ;Align the TRange
mov     bl,al                   ;TRange
mov     bh,0                   ;Upper index.
;
;   Need to setup the Dore Value Based on current TRange
;
push    ax

IFDEF   rzil1yp                ;5.08.1 6-3-93vw Set Dore
value
mov     ah,byte ptr cs:TDezeTable[bx]
mov     al,54h                  ; Index register to write
call    CfgWrite
```

Temperature Controller
Clock Manager
Processing Unit

Rising or Lowering at
Acceptable rate, if
index goes down,
clock speed goes up-
Clock frequency
increases. Direction
will indicate upward
trend.

Computes Clock
Speed

Receive clock
speed to set for
processor (CPU)

123. (New) An apparatus comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(U) ... said clock manager selectively stopping clock signals from being sent to a processing unit when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature

Modifies clock speed, clock frequency

Need to setup the Data Value based on current TRange

```
push    ax
;-----
IFDEF  x86llyp                ;5.08.1 6-3-95w Set Data
native
mov     ax,byte ptr ds:TDoreTable[pc]
mov     al,54h                ; index register to write
call    Cfgwrite
ENDIF  /x86llyp

;-----
IFDEF  x86llyd                ;5.08.1 6-3-95w Add Data
code here
ENDIF  /x86llyd

pop     ax                    ; Minutes to next scan
writeDownCountT:
mov     al,1ah
call    Cfgwrite              ; Write it out
leaveDownCountT:
pop     ax
pop     ax
pop     ax                    ;Restore Interrupts
ret
```

```
TDoreTable:
db      00h                  ; Disabled
db      10h                  ; 1 sec's
db      10h                  ; 1 sec
db      10h                  ; 1/2 sec
db      10h,10h,10h,10h,10h ; 4.48h 5-11-95
;      db      00h            ; 1/4 sec
```

EXHIBIT I-3

TempRange	label	byte
0CTempRange	label	byte
db	5ch	;Level 0
db	60h	;Level 1
db	10h	;Level 2
db	12h	;Level 3
db	14h	;Level 4
db	16h	;Level 5
db	18h	;Level 6
db	1ah	;Level 7
ACTempRange	label	byte
db	19h	;Level 0
db	1bh	;Level 1
db	1dh	;Level 2
db	1fh	;Level 3
db	21h	;Level 4
db	23h	;Level 5
db	25h	;Level 6
db	27h	;Level 7
OpDataTemperature	endp	

EXHIBIT I-9

Reference Temperature

EXHIBIT V-109

Note: The Macro 'FDEF' was added on 6-3-95 because This code was used for another Product also called llyd. The original code that was Working by 9/15/94 is there, the Macro for llyd does not have Any code generation as of yet Here since it was not written for The new product. As faster processors were added to llyd products, the tables changed to under them also (see 4.48h 5-11-95)

123. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(U) ... said clock manager selectively stopping clock signals from being sent to a processing unit when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature

EXHIBIT I-3

```
;
;      OSC, so set the temp level up by one
;
      mov     bh,00000000b      ;force downward
      cmp     al,7              ;Already at max?
      je      NotTR_OSC        ;yep, leave alone
      inc     al                ;force level temp up by one
NotTR_OSC:
;
;      Time needs to be set based on T Level
;
      mov     ah,7              ;Max available
      sub     ah,al              ;7-7 = 0 so watch it!
      cmp     ah,0
      jne     NotBig2           ;Not zero
      inc     ah                ;clock at every minute
NotBig2:shl     ah,3              ;Align the time constant
      or      ah,bh              ;Align the direction
      or      ah,al              ;Align the TRange
      mov     bl,al              ;TRange
      mov     bh,0              ;Upper index.
```

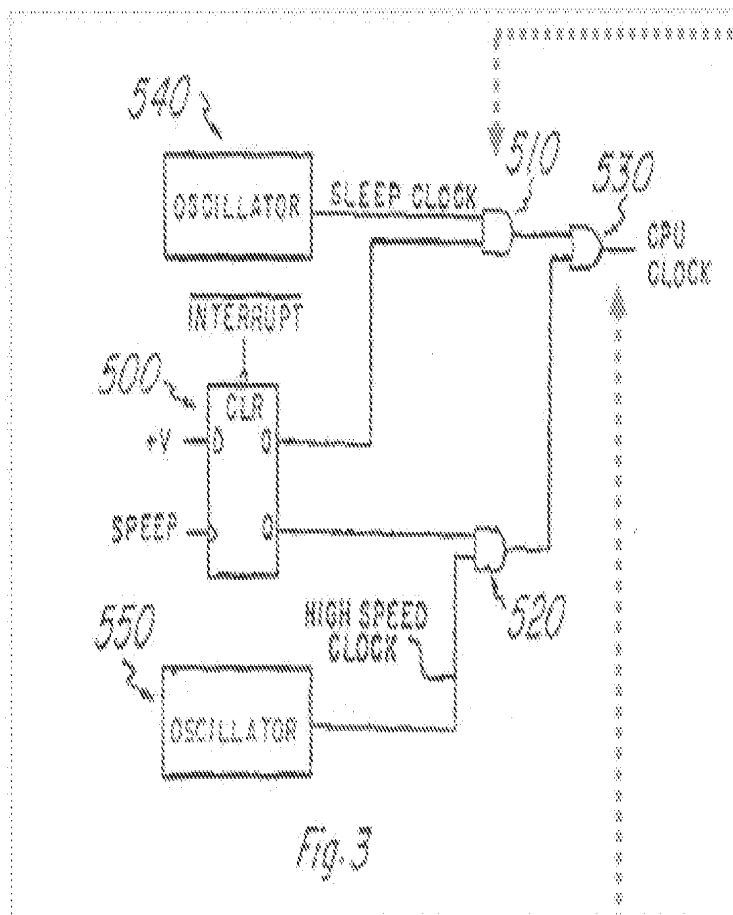
Tlevel sets time – based on acceptable level of temperature rise or fall
(direction gives rise or fall, and TRange give temperature Low and Max in range.
Acceptable rate is time and temperature based dependent on direction of trend.

EXHIBIT V-110

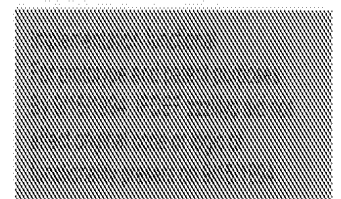
123. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(U) ... said clock manager selectively stopping clock signals from being sent to a processing unit when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature



Rising faster than
Acceptable rate,
forces second
clock signal



Computes Clock
Signal

Receive a First or
Second clock
signal

Claim 124

124. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (S)

Claim 124

124. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature (U)

(T) a temperature controller ...

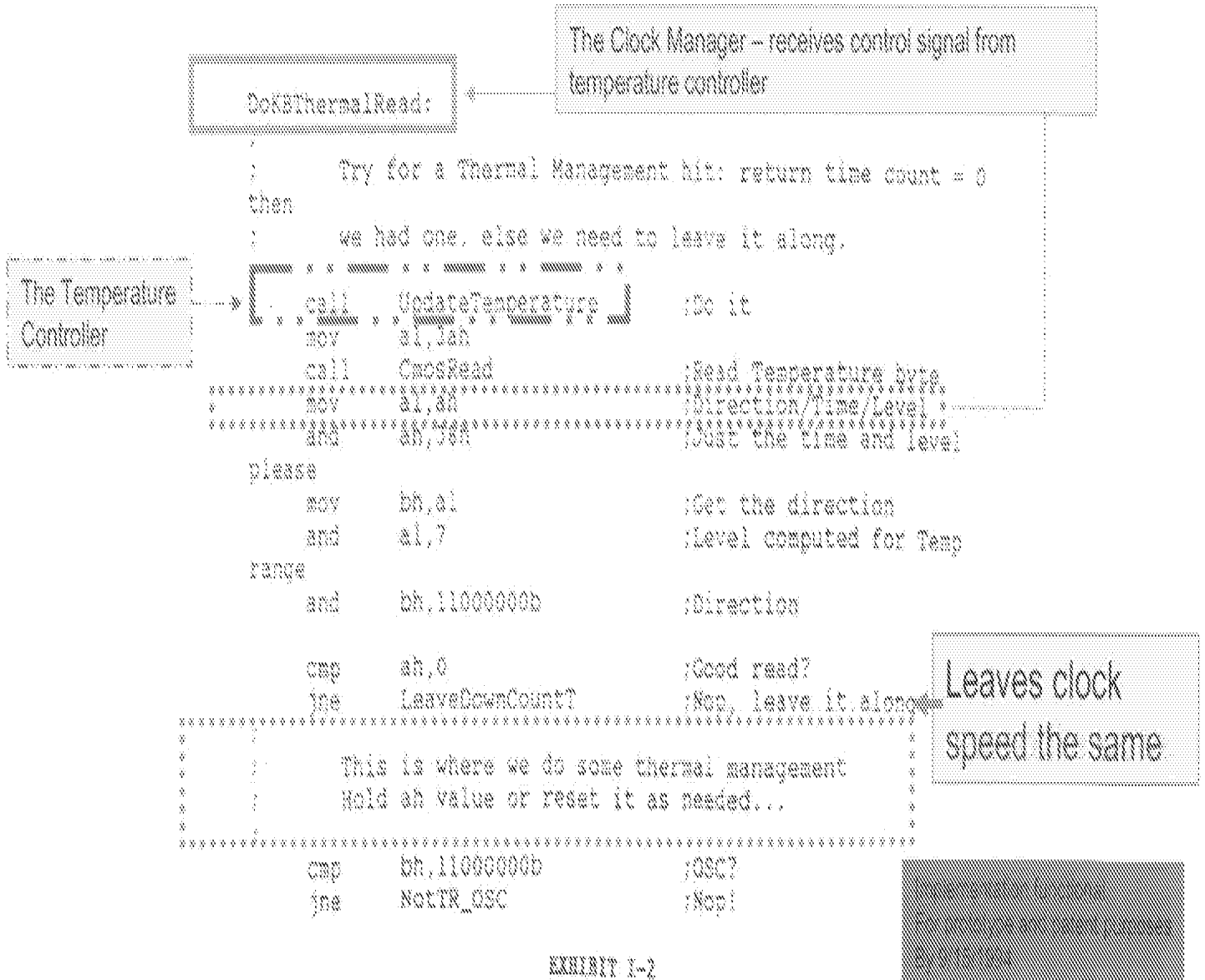


EXHIBIT I-2

EXHIBIT V-113

124. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(T) a temperature controller ...

The Temperature
Controller

EXHIBIT I-4

```
;
;      Read the Temperature on the system board controlled by
Keyboard Controller
;
;      Calling Arguments
;
;      Call    UpDateTemperature
;      ON exit, the cmos parameter will contain the correct
values
;
```

implementation of the
temperature controller
is shown in Exhibit I-4

```
mov     al,0xch          ;Output the read A/D.
;---> OUT     $40,al
testbcr_2:
loop    testbcr_2_Okay    ;1-10-95vw Don't hang here
jnp     ClearBusyKeyChannel ;1-10-95vw?Should we flush
here?
testbcr_2_Okay:           ;1-10-95vw
jmp     0+1
;---> In      al,$40        ;read status port
jmp     0+1
jmp     0+1
rest    al,2              ;check status of input port
```

EXHIBIT I-4

```
in      al,50h           ;full, then, get A/D value
cmp     al,0ffh          ;valid value?
je      ClearBusyKeyChannel ;Nop! 1-17-95vw
;DEMO CODE, WAIT: 1-12-95vw INACTIVE
cmp     al,00h
je      ClearBusyKeyChannel ;Nop! 1-17-95vw
push    ax
mov     ah,55h
xchg    al,ah
```

EXHIBIT I-6

Reads Temperature for
starting point

Register al contains temperature

Channels 64 was changed to 54 and 60 was changed to 50 after 9/15/94. Does not affect invention, just make product work better for multitasking operating systems. Same temperature was obtained either way. Channels 60 and 64 used for FCC and UL agency testing. Implementation was functional and complete for patent purpose by 9/15/94.

EXHIBIT V-114

124. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(T) a temperature controller ...

The Temperat
Controller

EXHIBIT I-8

SetRange:

→ xchg al,cl ;Al has temp back; ah=index
mov cx,7 ;CX = loop count

ScanRange:

mov bx,cx
add bl,ah ;Over index for ac or dc
cmp al,byte ptr cs:[TempRange+bx]
jg FoundRange ;CX=range number found
loop ScanRange

FoundRange: ;CX=range number found

Temperature for starting
point - Register al contains
temperature

Implementations:
For micro and patent purposes
S/N 1000000

124. (New) An apparatus, comprising:

a **temperature controller (T)** for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a **clock manager (M)** adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(T) a temperature controller ...

```
SetRange:
    mov     al,cl           ;al has temp back; ebx=index
    mov     cx,7           ;cx = loop count
```

```
ScanRange:
    mov     bx,cx
    add     bx,ah           ;Over index for ac or dc
    cmp     al,byte ptr ds:[TempRange+bx]
    jn      FoundRange     ;cx=range number found
    loop    ScanRange
```

```
FoundRange:
    ;cx=range number found
```

```
    mov     al,70h         ;Read Keyboard channel
    cld
    call    CmosRead
    mov     al,ah
    and     ah,0000
    and     al,al
    cmp     ah,dc00h       ;Last Temperature range
    cmp     al,al          ;Upper direction trend value
    jn      RangeStable   ;Value of cmos read
    jn      RangeUpward   ;stable process, same range
    jn      RangeUpward   ;New range is greater then
```

```
old one
    ;Range is downward trend
    cmp     ah,100000000h  ;Isstone upward?
    jn      RangeOSC      ;Yes, found osc
    mov     ch,01h
    jmp     short AllRange
```

```
RangeOSC:
    mov     ch,000h       ;OSC flag
    jmp     short AllRange
```

```
RangeStable:
    mov     ch,00h
    jmp     short AllRange
```

```
RangeUpward:
    cmp     ah,010000000b  ;last one Downward?
    jn      RangeOSC      ;Yes, Osc found
    mov     ch,10
```

```
AllRange:
    or      ch,cl         ;Range and range temp trend
    mov     ah,cl
    mov     al,7ah        ;note that I did loop
    bcd     for status display
    call    CmosWrite
```

```
ClearBusyKeyChannel:
    mov     al,0010h      ;Free Channel
    mov     bl,10000000h  ;Mask to write
    call    CmosWrite     ;Bit updated
```

```
BusyKeyChannel:
    pop     cx            ;1-10-93V
    pop     bx            ;1-10-93V
    pop     ax            ;1-10-93V
    popd
```

EXHIBIT V-6

Trend up, last up and this up more than last time, forcing index in TDozeTable to increase and this will decrease clock speed and clock frequency.

Predicting future changes
By studying trend to be downward, Upward, stable, or oscillating.

Implementing the functions
For the above and other purposes
By 01/10/94

124. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(M) a clock manager ...

The Clock Manager - receives control signal from temperature controller

The Temperature Controller

```

DoXBThermalRead:
    Try for a Thermal Management hit: return time count = 0
    then
        we had one, else we need to leave it along.
        call UpdateTemperature ;Do it
        mov     al,Jan
        call    CmosRead       ;Read Temperature byte
        mov     al,AB          ;Direction/Time/Level
        and     ah,Jan         ;Just the time and level
    please
        mov     bh,al          ;Get the direction
        and     al,7           ;Level computed for Temp
    range
        and     bh,11000000b   ;Direction
        cmp     ah,0           ;Good read?
        jne     LeaveDownCountT ;Nop, leave it alone
        This is where we do some thermal management
        Hold ah value or reset it as needed...
        cmp     bh,11000000b   ;OSC?
        jne     NotTR_OSC     ;Nop!

```

Leaves clock speed the same

FIG. 1 is a block diagram of a system for monitoring and controlling temperature of a device.

EXHIBIT I-2

EXHIBIT V-117

124. (New) An apparatus comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature (U)

(U) ... said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature.

```
;
;
;      OSC, so set the temp level up by one
;
      mov     bh,00000000b      ;Force downward
      cmp     al,7              ;Already at max?
      je      NotTR_OSC        ;yes, leave alone
      inc     al                ;force level temp up by one
NotTR_OSC:
;
;      Time needs to be set based on T Level
;
      mov     ah,7              ;Max available
      sub     ah,al             ;7-7 = 0 so watch it!
      cmp     ah,0
      jne     NotBig2          ;Not zero
      inc     ah               ;clock at every minute
NotBig2:shl     ah,1             ;Align the time constant
      or      ah,bh            ;Align the direction
      or      ah,al            ;Align the TRange
      mov     bl,al             ;TRange
      mov     bh,0             ;Upper index.
;
;      Need to setup the Doze Value based on current TRange
;
      push    ax

IFDEF  xtalilyp                ;5.08.1 6-3-95vw Set Doze
value
      mov     ah,byte ptr cs:TDozeTable[bx]
      mov     al,54h           ; Index register to write
      call    CfgWrite
```

Temperature Controller
Monitors and predicts changes
in temperature

Rising faster than
Acceptable rate,
forces lower
clock speed

Computes Clock
Speed

Receive clock
speed to set for
processor (CPU)

124. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(U) ... said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature.

Modifies clock speed

```

;
; Need to setup the Base Value based on current TRange
;
        push    ax

IFDEF    i486i486                ;5.08.1 6-3-95w let Base
value
        mov     ah,byte ptr ds:[TemperatureTable]
        mov     al,0Ah           ; Index register to write
        call    WriteWrite
ENDIF    i486i486

IFDEF    i486i486                ;5.08.1 6-3-95w Add code
code here
ENDIF    i486i486

        pop     ax               ; Minutes to next scan
        WriteDownCount:
        mov     al,0Ah
        call    ClockWrite       ; Write it out
        LeaveDownCount:
        pop     ax
        pop     ax
        popfd                    ; Restore Interrupts
        ret

```

```

TemperatureTable:
db      00h                    ; Disabled
db      30h                    ; 3 sec's
db      30h                    ; 1 sec
db      20h                    ; 1/2 sec
db      20h,20h,20h,20h,20h   ; 4.48b 5-11-95
;      db      20h              ; 1/4 sec

```

EXHIBIT L-3

Temperature Table
5.08.1 6-3-95w
5.08.1 6-3-95w

Temperature	label	byte
ECTempRange	label	byte
db	00h	/Level 0
db	00h	/Level 1
db	10h	/Level 2
db	10h	/Level 3
db	14h	/Level 4
db	14h	/Level 5
db	18h	/Level 6
db	18h	/Level 7
ECTempRange	label	byte
db	10h	/Level 0
db	10h	/Level 1
db	10h	/Level 2
db	10h	/Level 3
db	10h	/Level 4
db	10h	/Level 5
db	10h	/Level 6
db	10h	/Level 7

UpdatedTemperature endp

EXHIBIT L-4

Reference Temperature

Note: The Macro "IFDEF" was added on 6-3-95 because This code was used for another Product also called lilyd. The original code that was Working by 9/18/94 is there, the Macro for lilyd does not have Any code generation as of yet Here since it was not written for The new product. As faster processors were added to lilyd products, the tables changed to under them also (see 4.48b 5-11-95)

124. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(U) ... said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature.

Temperature Controller
Clock Manager
Clock Manager

EXHIBIT I-3

```

;
;      OSC, so set the temp level up by one
;
      mov     bh,00000000b      ;Force downward
      cmp     al,7              ;Already at max?
      je      NotTR_OSC        ;yes, leave alone
      inc     al                ;Force level temp up by one
NotTR_OSC:
;
;      Time needs to be set based on T Level
;
      mov     ah,7              ;Max available
      sub     ah,al              ;7-7 = 0 so watch it!
      cmp     ah,0
      jne     NotBig2           ;Not zero
      inc     ah                ;Look at every minute
NotBig2:shl     ah,2              ;Align the time constant
      or      ah,bh              ;Align the direction
      or      ah,al              ;Align the TRange
      mov     bl,al              ;TRange
      mov     bh,0              ;Upper index.
;

```

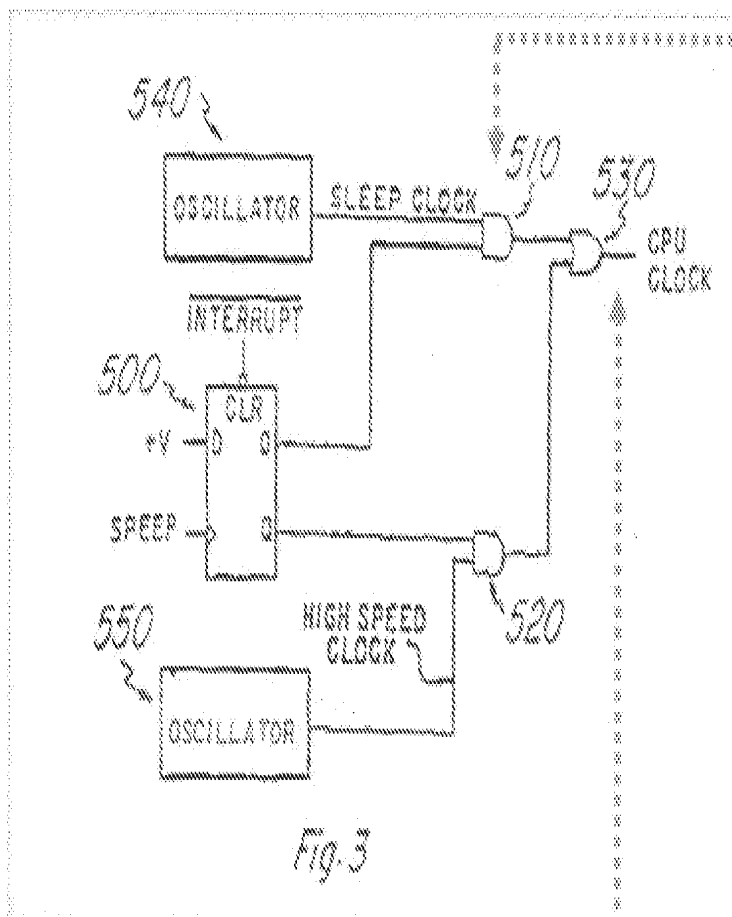
Tlevel sets time – based on acceptable level of temperature rise or fall (direction gives rise or fall, and TRange give temperature Low and Max in range. Acceptable rate is time and temperature based dependent on direction of trend.

EXHIBIT V-120

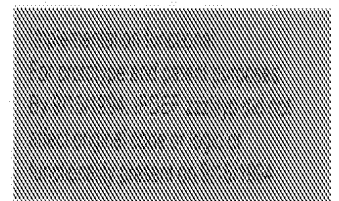
124. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature. (U)

(U) ... said clock manager reducing processing unit clock speed when said monitored temperature rises to at least a selected reference temperature and thereafter continues to rise on successive readings of said monitored temperature.



Rising faster than
Acceptable rate,
forces second
clock signal



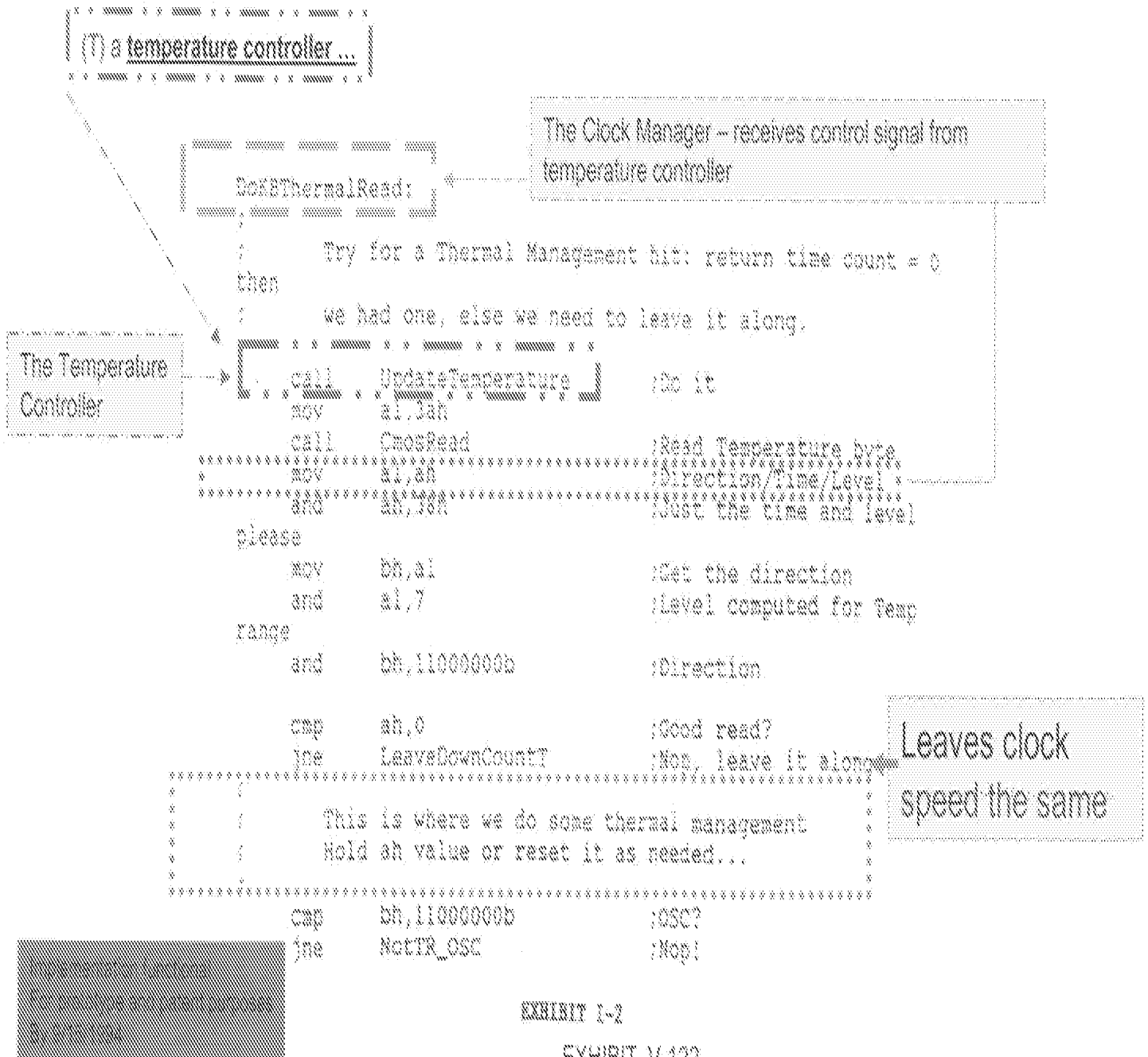
Computes Clock
Signal

Receive a First or
Second clock
signal

Claim 125

125. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)



125. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(T) a temperature controller ...

The Temperature Controller

EXHIBIT I-4

```

:
:      Read the Temperature on the system board controlled by
Keyboard Controller
:
:      Calling Arguments
:
:      Call      UpDateTemperature
:      ON exit, the cmos parameter will contain the correct
values
:

```

```

mov     al,0x4b      ;Output the read A/D.
**** out     $4b,al
: testkbc_2:
:      loop     testkbc_2 Okay      ;3-30-95vv Don't hang here
:      jmp      ClearBusyKeyChannel ;3-30-95vv?Should we flush
:      here?
:      testkbc_2 Okay:             ;3-30-95vv
:      jmp     $+1
:      **** in     al,$4b          ;read status port
:      jmp     $+2
:      jmp     $+3
:      test     al,2              ;check status of input port
:

```

EXHIBIT I-5

Reads Temperature for starting point

```

**** in     al,$0h          ;full. then, get A/D value
:
:      cmp     al,0fffh        ;valid value?
:      ja      ClearBusyKeyChannel ;Nop! 3-17-95vv
:      ;02B00 GOOD. Note 3-12-95vv INACTIVE
:
:      cmp     al,00h
:      ja      ClearBusyKeyChannel ;Nop! 3-17-95vv
:      push    ax
:      mov     ah,$3h
:      xchg    al,ah
:

```

EXHIBIT I-6

Register al contains temperature

Channels 64 was changed to 54 and 60 was changed to 50 after 9/15/94. Does not affect invention, just make product work better for multitasking operating systems. Same temperature was obtained either way. Channels 60 and 64 used for FCC and UL agency testing. Implementation was functional and complete for patent purpose by 9/15/94.

EXHIBIT V-123

125. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(T) a temperature controller ...

The Temperature
Controller

EXHIBIT I-8

```

SetRange:
    xchg    al,cl          ;Al has temp back; ah=index
    mov     cx,7           ;cx = loop count

ScanRange:
    mov     bx,cx
    add     bl,ah           ;Over index for ac or dc
    cmp     al,byte ptr cs:[TempRange+bx]
    jg      FoundRange     ;CX=range number found
    loop    ScanRange

FoundRange:
    ;CX=range number found
    
```

Temperature for starting
point - Register al contains
temperature

EXHIBIT I-8
Temperature for starting
point - Register al contains
temperature

125. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(T) a temperature controller ...

```
SettRange:
    mov     al,cl          ;Al has temp back: sh=index
    mov     cx,7           ;cx = loop count
```

```
ScanRange:
    mov     dx,cx
    add     bl,ah          ;Over index for ac or dc
    cmp     al,byte ptr cs:[TempRange+bx]
    jg      FoundRange     ;dx=range number found
    loop    ScanRange
```

```
FoundRange:
    ;dx=range number found
```

```
    mov     al,00h        ;Read Keyboard channel
access flag
    call    CmosRead
    mov     al,ah
    and     al,3          ;Last Temperature range
    and     ah,0000h       ;Upper direction trend value
    cmp     cl,al         ;Value of cmos read
    je      RangeStable   ;Stable process, same range
    je      RangeUpward   ;New range is greater than
old osc
    ;
    ;Range is downward trend
    cmp     ah,10000000h   ;Last one upward?
    je      RangeOSC      ;Yes, found osc
    mov     ch,01h
    jmp     short AllRange
RangeOSC:
    mov     ch,0000h      ;OSC flag
    jmp     short AllRange
RangeStable:
    mov     ch,00h
    jmp     short AllRange
RangeUpward:
    cmp     ah,01000000h   ;Last one Downward?
    je      RangeOSC      ;Yes, Osc found
    mov     ch,10
```

```
AllRange:
    or      ch,al          ;Range and range temp trend
    mov     ah,cl
    mov     al,0ah        ;Note that I bit later
    bits for status complete
    call    CmosWrite
```

```
CloseKeyChannel:
    mov     ax,0007h      ;Free Channel
    mov     al,00000000h   ;Data to write
    call    CmosWriteData
    ;data updated
```

```
OpenKeyChannel:
    pop     cx            ;10-10-0000
    pop     dx            ;10-10-0000
    pop     ax            ;10-10-0000
```

```
popl       ;Restore status and
```

EXHIBIT V-8

Predicting future changes
By studying trend to be downward,
Upward, stable, or oscillating.

EXHIBIT V-9
For use in a separate document
B-10-10-00

125. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(M) a clock manager ...

The Clock Manager -- receives control signal from temperature controller

The Temperature Controller

```

DoKEThermalRead:
    ; Try for a Thermal Management hit: return time count = 0
    ; then
    ; we had one, else we need to leave it along.

    ; *****
    call    UpdateTemperature    ;Do it
    mov     al,Jan
    call    CmosRead             ;Read Temperature byte.
    mov     al,ah                ;Direction/Time/Level
    and     ah,Jan               ;Just the time and level

    please
    mov     bh,al                ;Get the direction
    and     al,7                 ;Level computed for Temp
    range
    and     bh,11000000b         ;Direction

    cmp     ah,0                 ;Good read?
    jne     LeaveDownCountT      ;Nop, leave it alone

    ; *****
    ; This is where we do some thermal management
    ; Hold ah value or reset it as needed...
    ; *****

    cmp     bh,11000000b         ;OSC?
    jne     NotTR_OSC            ;Nop!

```

Leaves clock speed the same

EXHIBIT I-2

EXHIBIT V-126

125. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(U) ... said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature.

```

; OSC, so set the temp level up by one
;
mov     bh,00000000h           ;force downward
cmp     al,7                   ;Already at max?
je      NotTR_OSC              ;yes, leave alone
inc     al                     ;force level temp up by one
NotTR_OSC:
;
; Time needs to be set based on T Level
;
mov     ah,7                   ;Max available
sub     ah,al                   ;7-7 = 0 so watch it!
cmp     ah,0
jne     NotBig2                 ;Not zero
inc     ah                     ;Clock at every minute
NotBig2:shl     ah,3             ;Align the time constant
or      ah,bh                   ;Align the direction
or      ah,al                   ;Align the TRange
mov     bl,al                   ;TRange
mov     bh,0                   ;Upper index.
;
; Need to setup the Dose Value based on current TRange
;
push    ax

IFDEF   rzslilyp                ;5.08.1 5-3-99vw Set Dose
value
mov     ah,byte ptr cs:TDOseTable[bx]
mov     al,54h                  ; index register to write
call    cfgWrite

```

Temperature Controller
Monitoring and Predicting
Future Changes

Rising or Lowering at
Acceptable rate, if
index goes down,
clock speed goes up-
Clock frequency
increases. Direction
will indicate upward
trend.

Computes Clock
Speed

Receive clock
speed to set for
processor (CPU)

125. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(U) ... said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature.

Modifies clock speed, clock frequency

Need to setup the Dose Value based on current Range

```
IFDEF xalllyp ;5.08.1 6-3-95W Set Dose
value
mov ah,byte ptr ds:[DoseTable[by]]
mov al,1ah ; Index register to write
call CfgWrite
ENDIF ;xalllyp
```

```
IFDEF xalllyd ;3.08.1 6-3-95W Add dose
code here
ENDIF ;xalllyd
```

```
pop ax ; Minutes to next scan
WriteDownCountT:
mov al,1ah
call CfgWrite ; Write it out
LeaveDownCountT:
pop bx
pop ax
popl ; Restore Interrupts
ret
```

```
DoseTable:
db 00h ; Disabled
db 10h ; 1 sec's
db 10h ; 1 sec
db 20h ; 1/2 sec
db 20h,20h,20h,20h,20h ; 4.48h 5-11-95
db 20h ; 1/4 sec
```

EXHIBIT I-3

TempRange	label	byte
000h-009h	label	byte
00h	00h	Level 0
01h	01h	Level 1
02h	10h	Level 2
03h	10h	Level 3
04h	14h	Level 4
05h	14h	Level 5
06h	18h	Level 6
07h	18h	Level 7

ADTempRange	label	byte
00h	10h	Level 0
01h	10h	Level 1
02h	10h	Level 2
03h	10h	Level 3
04h	21h	Level 4
05h	21h	Level 5
06h	23h	Level 6
07h	23h	Level 7

UpdateTemperature endp

EXHIBIT I-9

Note: The Macro "IFDEF" was added on 6-3-95 because This code was used for another Product also called lilyd. The original code that was Working by 9/15/94 is there, the Macro for lilyd does not have Any code generation as of yet Here since it was not written for The new product. As faster processors were added to lilyd products, the tables changed to under them also (see 4.48h 5-11-95)

Reference Temperature

EXHIBIT V-128

125. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(U) ... said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature.

EXHIBIT I-3

```

;
;      OSC, so set the temp level up by one
;
      mov     bh,00000000b      ;Force downward
      cmp     al,7              ;Already at max?
      je      NotTR_OSC         ;yep, leave alone
      inc     al                ;force level temp up by one
NotTR_OSC:
;
;      Time needs to be set based on T Level
;
      mov     ah,7              ;Max available
      sub     ah,al             ;7-7 = 0 so watch it!
      cmp     ah,0
      jne     NotBig2          ;Not zero
      inc     ah               ;Look at every minute
NotBig2: shl     ah,1           ;Align the time constant
      or      ah,bh            ;Align the direction
      or      ah,al            ;Align the TRange
      mov     dl,al            ;TRange
      mov     bh,0             ;Upper index.

```

Tlevel sets time – based on acceptable level of temperature rise or fall (direction gives rise or fall, and TRange give temperature Low and Max in range. Acceptable rate is time and temperature based dependent on direction of trend.

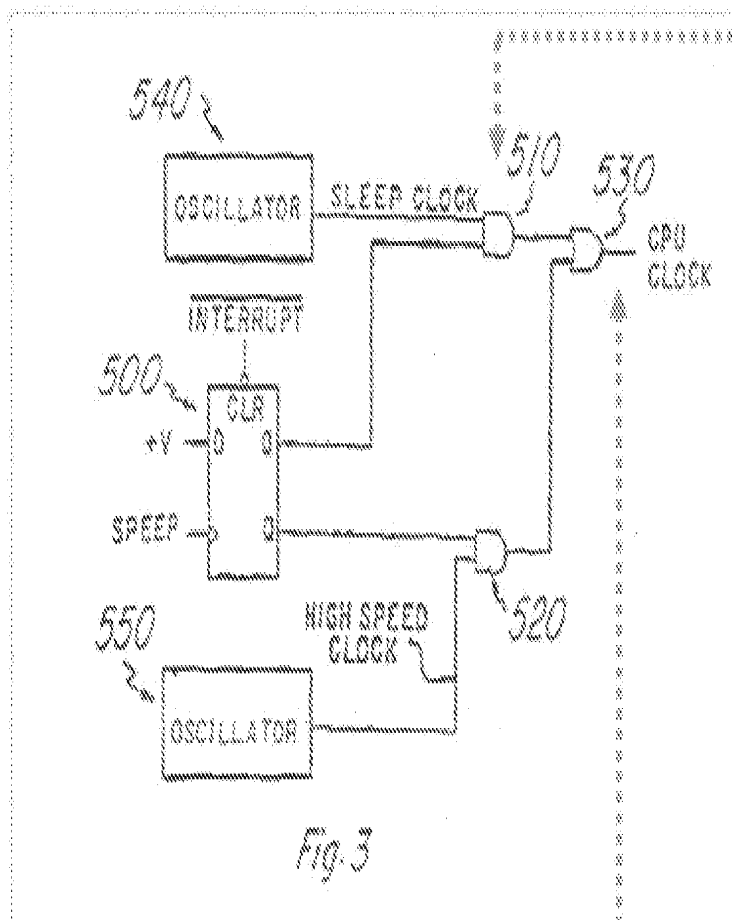
EXHIBIT V-129

125. (New) An apparatus, comprising:

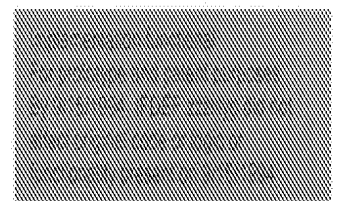
a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(U) ... said clock manager selectively stopping clock signals from being sent to a processing unit in response to successive readings of said monitored temperature indicating an upward trend in temperature.



Rising faster than
Acceptable rate,
forces second
clock signal



Computes Clock
Signal

Receive a First or
Second clock
signal

Claim 126

126. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(T) a temperature controller ...

DoKBThermalRead:

The Clock Manager – receives control signal from temperature controller

```

; Try for a Thermal Management hit: return time count = 0
then
; we had one, else we need to leave it along.

```

The Temperature Controller

```

; Do it
call    UpdateTemperature
mov     al,3ah
call    CmosRead           ;Read Temperature byte.
mov     al,ah              ;Direction/Time/Level
add     ah,30h             ;Just the time and level

```

```

please
mov     bh,al              ;Get the direction
and     al,7               ;Level computed for Temp
range
and     bh,11000000b       ;Direction

```

```

cmp     ah,0               ;Good read?
jne     LeaveDownCount?    ;No, leave it alone

```

Leaves clock speed the same

```

; This is where we do some thermal management
; Hold ah value or reset it as needed...

```

```

cmp     bh,11000000b       ;GSC?
jne     NotTR_GSC          ;Nop!

```

EXHIBIT 1-2
EXHIBIT 131

EXHIBIT 1-2

EXHIBIT 131

126. (New) An apparatus, comprising:

- a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
- a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(T) a temperature controller ...

The Temperature
Controller

EXHIBIT I-4

Read the Temperature on the system board controlled by
Keyboard Controller

Calling Arguments

Call UpDateTemperature

ON exit, the cmcs parameter will contain the correct
values

```
mov     al,004h      ;Output the read A/D.
**** out  $4B,al
* testkbc_2)
* loop    testkbc_1,okay ;3-10-95w Don't hang here.
* jmp     ClearBusyKeyChannel ;3-10-95w?Should we flush?
* hark?
* testkbc_1,okay:      ;3-10-95w
* jmp     $+1
**** in    $1,54h      ;read status port
* jmp     $+1
* jmp     $+2
* test    al,1         ;check status of input port
*
**** in    $1,50h      ;fall, then, get A/D value
* cmp     al,0ffh      ;valid value?
* je      ClearBusyKeyChannel ;Nop! 3-17-95w
*          ;DEBUG CODE...Notts 3-12-95w INACTIVE
* cmp     al,00h
* je      ClearBusyKeyChannel ;Nop! 3-17-95w
* push    ax
* mov     dx,33h
* xchg    al,ah
```

EXHIBIT I-6

Reads Temperature for
starting point

Register al contains temperature

Channels 64 was changed to 54 and 60 was changed to 50 after 9/15/94. Does not affect invention, just make product work better for multitasking operating systems. Same temperature was obtained either way. Channels 60 and 64 used for FCC and UL agency testing. Implementation was functional and complete for patent purpose by 9/15/94.

EXHIBIT V-132

126. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(T) a temperature controller ...

The Temperature
Controller

EXHIBIT I-8

```
SetRange:
    xchg    al,cl          ;Al has temp back; ah=index
    mov     cx,7           ;cx = loop count

ScanRange:
    mov     bx,cx
    add     bl,ah          ;Over index for ac or dc
    cmp     al,byte ptr cs:[TempRange+bx]
    jg      FoundRange     ;cx=range number found
    loop    ScanRange
FoundRange:                ;cx=range number found
```

Temperature for starting
point - Register al contains
temperature

EXHIBIT I-9

EXHIBIT V-133

126. (New) An apparatus, comprising:

- a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
- a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(T) a temperature controller ...

```
GetRange:
    xchg    al,cl           ;Al has temp back; ah=index
    mov     cx,7           ;cx = loop count
```

```
ScanRange:
    mov     bx,cx
    and     bl,ah           ;Over index for ah or dx
    cmp     al,byte ptr ds:[TempRange+bx]
    jg      foundRange     ;over-range number found
    loop    ScanRange
```

FoundRange: ;over-range number found

```
    mov     al,00h         ;Send Keyboard channel
    cld
    call    OutKey
    mov     al,ah
    and     al,7           ;Last temperature range
    and     ah,0c0h        ;Upper direction trend value
    cmp     cl,al          ;Value of ones read
    je      RangeStable    ;Stable process. same range
    je      RangeUpward    ;New range is greater than
```

```
old one
    ;Range is downward trend
    cmp     ah,10000000h    ;Is one upward?
    je      RangeOSC       ;Yes, found osc
```

```
    mov     ch,01h
    jmp     short AllRange
```

```
RangeOSC:
    mov     ch,0c0h        ;OSC flag
    jmp     short AllRange
```

```
RangeStable:
    mov     ch,00h
    jmp     short AllRange
```

```
RangeUpward:
    cmp     ah,01000000h    ;Last one Downward?
    je      RangeOSC       ;Yes. Osc found
    mov     ch,10
```

```
AllRange:
    or      ch,cl           ;Range and range temp trend
    mov     ah,cl
    mov     al,7eh         ;Mask that I bit into 0
    bts     eax,0           ;Bit for status complete
    call    OutWrite
```

```
ClearKeyTempChannel:
    mov     ax,00010h      ;Free channel
    mov     bx,10000000h    ;Mask to write
    call    OutWriteMask   ;Bit updated
```

```
BusyKeyChannel:
    pop     cx             ;0-10-0000
    pop     bx             ;0-10-0000
    pop     ax             ;0-10-0000
```

popf ;Restore status and

EXHIBIT V-134

Predicting future changes
By studying trend to be downward,
Upward, stable, or oscillating.

EXHIBIT V-134
For use in the exhibit
EXHIBIT V-134

EXHIBIT V-134

126. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and
a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(M) a a clock manager ...

The Clock Manager – receives control signal from temperature controller

The Temperature Controller

```
DoK8ThermalRead:
;
; Try for a Thermal Management hit; return time count = 0
; then
; we had one, else we need to leave it along.
```

```
call    UpdateTemperature    ;Do it
mov     al,3ah
call    CmosRead             ;Read Temperature byte.
mov     al,ah                ;Direction/Time/Level.
and     ah,3ah               ;Just the time and level
```

```
please
mov     bh,al                ;Get the direction
and     al,7                 ;Level computed for Temp
range
and     bh,11000000b         ;Direction
```

```
cmp     ah,0                 ;Good read?
jne     LeaveDownCount?     ;Nop, leave it alone
```

Leaves clock speed the same

```
;
; This is where we do some thermal management
; Hold ah value or reset it as needed...
```

```
cmp     bh,11000000b         ;OSC?
jne     NotTR_OSC            ;Nop!
```

EXHIBIT V-135

EXHIBIT L-2

EXHIBIT V-135

126. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(U) ... said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature.

```
;
;      OSC, so set the temp level up by one
;
;      mov     bh,00000000b           ;force downward
;      cmp     al,7                   ;Already at max?
;      je      NotTR_OSC              ;yep, leave alone
;      inc     al                     ;force level temp up by one
NotTR_OSC:
;
;      Time needs to be set based on T Level
;
;      mov     ah,7                   ;Max available
;      sub     ah,al                   ;7-7 = 0 so watch it!
;      cmp     ah,0
;      jne     NotBig2                ;Not zero
;      inc     ah                     ;Look at every minute
NotBig2: shl     ah,2                  ;Align the time constant
;      or      ah,bh                   ;Align the direction
;      or      ah,al                   ;Align the TRange
;      mov     bl,al                   ;TRange
;      mov     bh,0                   ;Upper index.
;
;      Need to setup the Doze Value based on current TRange
;
;      push    ax
;
;      IFDEF   rzallilyp               ;5.08.1 6-3-95vw Set Doze
;      value
;      mov     ah,byte ptr cs:TDozeTable[bx]
;      mov     al,54h                 ; Index register to write
;      call    CfgWrite
```

Information function
for processor and other purposes
07/01/02

Rising or Lowering at
Acceptable rate, if
index goes down,
clock speed goes up-
Clock frequency
increases. Direction
will indicate upward
trend.

Computes Clock
Speed

Receive clock
speed to set for
processor (CPU)

126. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(U) ... said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature.

Modifies clock speed, clock frequency

Need to setup the Data Value based on current TRange

```
IFDEF ixlilyp ;I.08.1 6-3-95-W Set Data
;Value
mov ah,byte ptr ds:TDataTable[bx]
mov al,54h ; Index register to write
call WriteWrite
ENDIF ;ixlilyp
```

```
IFDEF ixlilyp ;I.08.1 6-3-95-W add data
code here
ENDIF ;ixlilyp
```

```
pop ax ; Disables to next scan
WriteDownCountT:
mov al,1ah
call CountWrite ; Write it out
LeaveDownCountT:
pop bx
pop ax
push ; Restore Interrupts
ret
```

```
TDataTable:
db 00h ; Disabled
db 30h ; 1 sec/s
db 30h ; 1 sec
db 30h ; 1/2 sec
db 30h,20h,20h,20h,20h ; 4.48b 5-11-95
db 30h ; 1/4 sec
```

EXHIBIT I-3

TempRange	label	byte
DTempRange	label	byte
db	00h	:Level 0
db	00h	:Level 1
db	10h	:Level 2
db	10h	:Level 3
db	10h	:Level 4
db	10h	:Level 5
db	10h	:Level 6
db	10h	:Level 7
ATempRange	label	byte
db	10h	:Level 0
db	10h	:Level 1
db	10h	:Level 2
db	10h	:Level 3
db	10h	:Level 4
db	10h	:Level 5
db	10h	:Level 6
db	10h	:Level 7

UpdateTemperature ends

EXHIBIT I-4

Note: The Macro "IFDEF" was added on 6-3-95 because This code was used for another Product also called lilyp. The original code that was Working by 9/15/94 is there, the Macro for lilyp does not have Any code generation as of yet Here since it was not written for The new product. As faster processors were added to lilyp products, the tables changed to under them also (see 4.48b 5-11-95)

Reference Temperature

EXHIBIT V-137

126. (New) An apparatus, comprising:

a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(U) ... said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature.

EXHIBIT I-3

```

;
; OSC, so set the temp level up by one
;
mov     bh,00000000b           ;Force downward
→ cmp    al,7                   ;Already at max?
je      NotTR_OSC              ;yep, leave alone
→ inc     al                     ;Force level temp up by one
NotTR_OSC:
;
; Time needs to be set based on T Level
;
mov     ah,7                   ;Max available
sub     ah,al                   ;7-7 = 0 so watch it!
cmp     ah,0
jne     NotBig2                 ;Not zero
inc     ah                      ;Look at every minute
NotBig2:shl     ah,2             ;Align the time constant
or      ah,bh                   ;Align the direction
or      ah,al                   ;Align the TRange
mov     bl,al                   ;TRange
mov     bh,0                    ;Upper index..

```

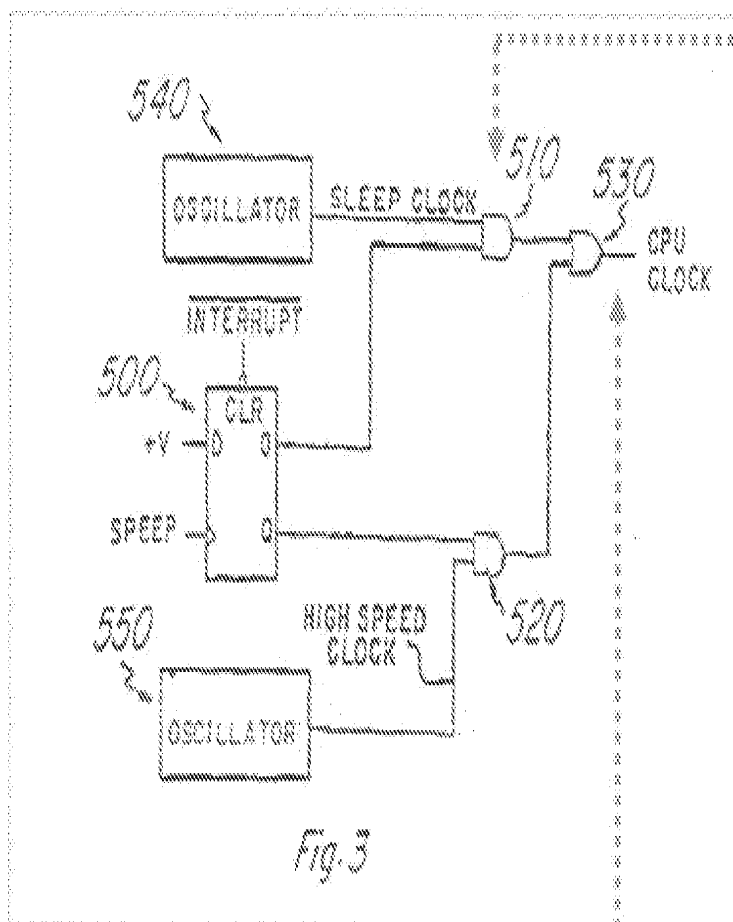
Tlevel sets time – based on acceptable level of temperature rise or fall
(direction gives rise or fall, and TRange give temperature Low and Max in range.
Acceptable rate is time and temperature based dependent on direction of trend.

126. (New) An apparatus, comprising:

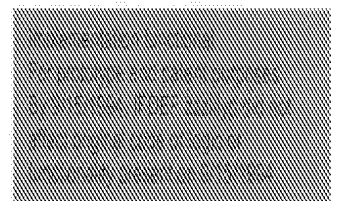
a temperature controller (T) for monitoring temperature associated said apparatus and, using said monitored temperature at least once as a starting point, predicting future changes in said monitored temperature; and

a clock manager (M) adapted to receive a control signal from said temperature controller, said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature. (U)

(U) ... said clock manager reducing processing unit clock speed in response to successive readings of said monitored temperature indicating an upward trend in temperature.



Rising faster than
Acceptable rate,
forces second
clock signal



Computes Clock
Signal

Receive a First or
Second clock
signal

	5/4/1994	7/20/1994	8/30/1994	9/14/1994	9/15/1994	10/14/1994	11/8/1994	11/19/1994	12/15/1994	2/11/1995	2/25/1995	3/12/1995	3/24/1995	5/11/1995
Coding Started on various programs/subroutines (example APM530I.asm -enable/disable Power Management)	Started													
HI_PWR.exe created		Completed												
HEAT.BAT used for Heat Testing Last Modified				Completed										
TEMPTMS.INC functionality completed and heat testing started with New HEAT.BAT					Completed									
RAM Based functional implementation Completed					Completed									
...Temperatures and control signals stored in CMOS RAM area to be read by control logic for predicting future temperature such as Up, Down, Stable, or Oscillating.					Completed									
Logic completed for Claims:					Completed									
...Claims 17 and 18 working in prototype					Completed									
...Claims 21, 23, 74-76 working in prototype					Completed									
...Claims 77, 78, 79,80, 81, and 82 (Prototype Unit completed used keyboard, LCD Display, and Intel CPU)					Completed									
...Claims 83,84,and 85 (Prototype Unit completed used PCI Bus coupled to CPU)					Completed									
...Claims 83,84, and 85 (Prototype Unit completed used PCI Bus coupled to CPU with PCMCIA controller)					Completed									
...Claims 89-94 (Prototype Unit completed used keyboard controller and port 60/84h to get temperature)					Completed									
...Claims 95-100 (Prototype Unit completed but limitation of technology forced usage of adjacent sensor to CPU)					Conceived									
...Claims 101-106 working in prototype					Completed									
...Claims 110-113, 116-119, 122-126 working in prototype					Completed									
TEMPTMS.ASM Coded with channel 60/84h access to A/D converter		Completed		Used for Testing										
Rewrite TEMPTMS.ASM and TRANGE.INC for new channel A/D access for temperature sensor, review for Flash					Started		Informed Testers		Completed					
Trange.INC Recoded from TEMPTMS.ASM for new channel access, Ports 54 and 50h, review for Flash					Started	Used for Testing	Informed Testers			Completed				
Tested Heat and Power Mangement on Pentium 90MHz CPU (75 MHz already tested on 9/15/1994)								Completed						
Trange.INC Recoded for BatteryPro Access via Flash Memory										Completed				
Started coding on Auto, On, and Off control by User Selection, ROM Based										Started		Completed		
Auto, On, and / or Off allowed to be setup by User functional implementation ROM Based.												Completed		
..Logic completed for Claims:												Completed		
...Claim 19												Completed		
...Claim 20												Completed		
...Claim 107, 108, and 109												Completed		
Added Tables for Faster Processors as Intel introduced new products														Completed